PMM

Precision Metal Molding

INCLUDING DIE CASTINGS MAGAZINE

FEBRUARY
1957

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DIE CASTINGS

INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS

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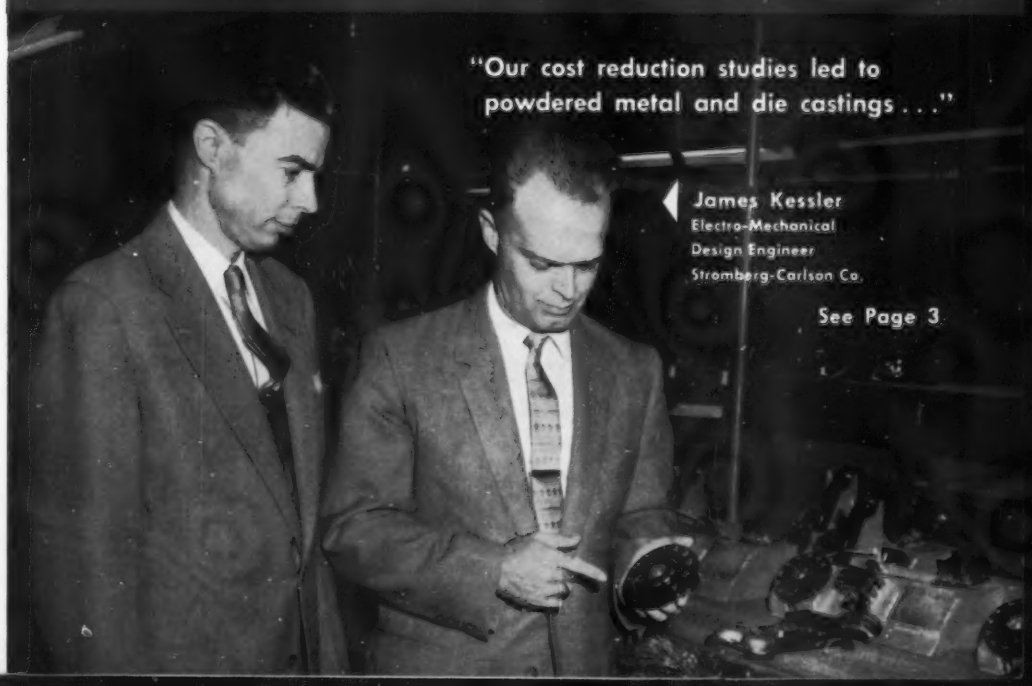

"Our cost reduction studies led to powdered metal and die castings . . ."

James Kessler
Electro-Mechanical
Design Engineer
Stromberg-Carlson Co.

See Page 3

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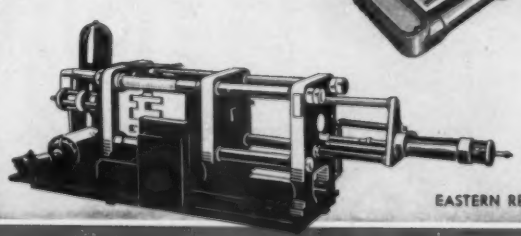

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IN THIS ISSUE

February 1957: Volume 15 Number 2

COVER STORY

COST REDUCTION STUDIES involve more than dollar and cents comparisons. Here, Louis Droel, left, assistant development director of telecommunication engineering, and James Kessler, electro mechanical design engineer at Stromberg-Carlson Co., examine a telephone dial base which has been the subject of careful cost reduction studies. For the results, see page 35.

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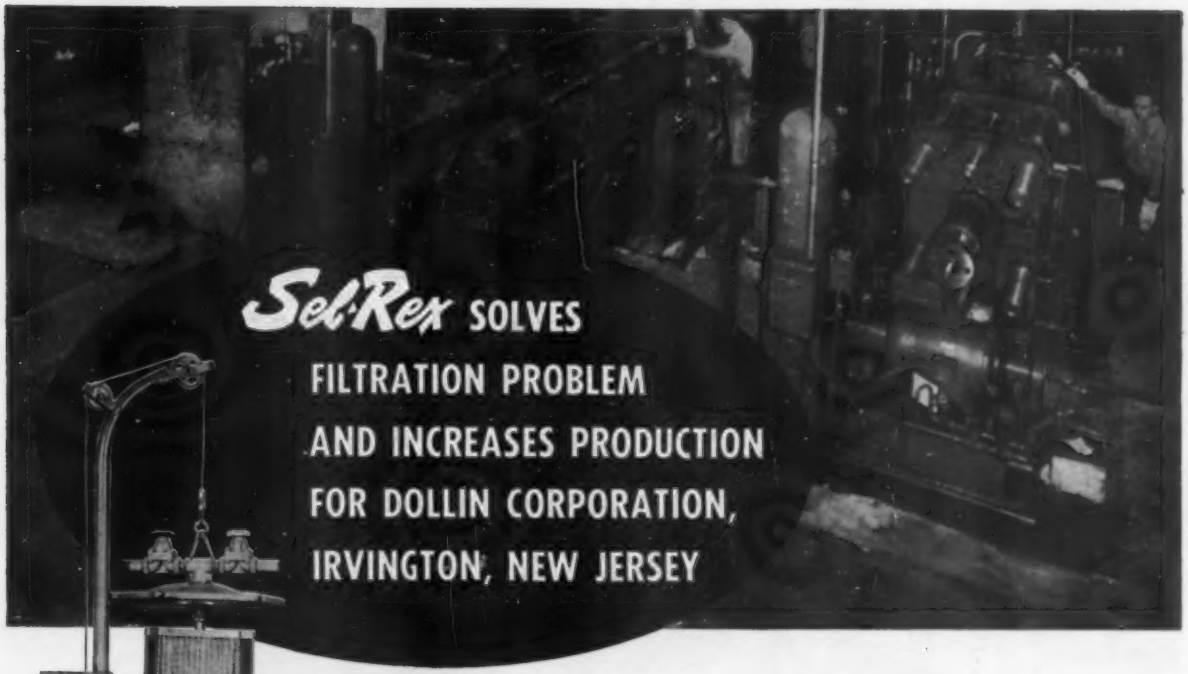

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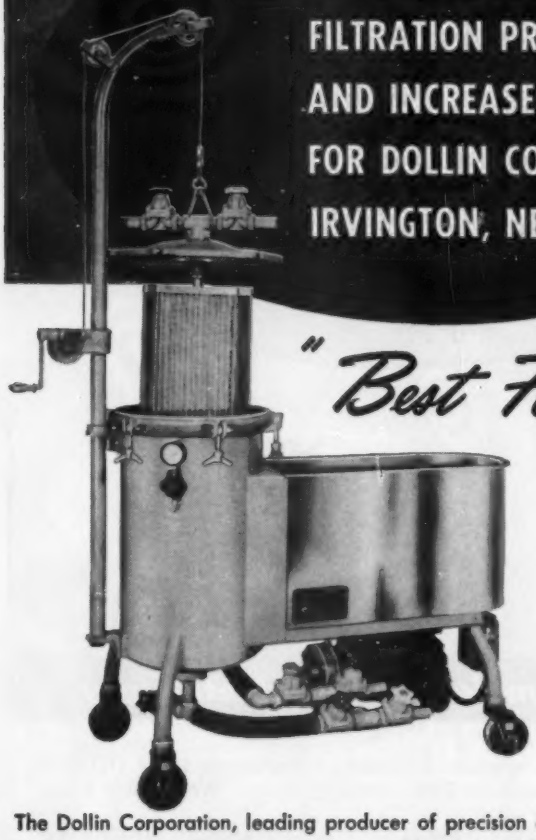

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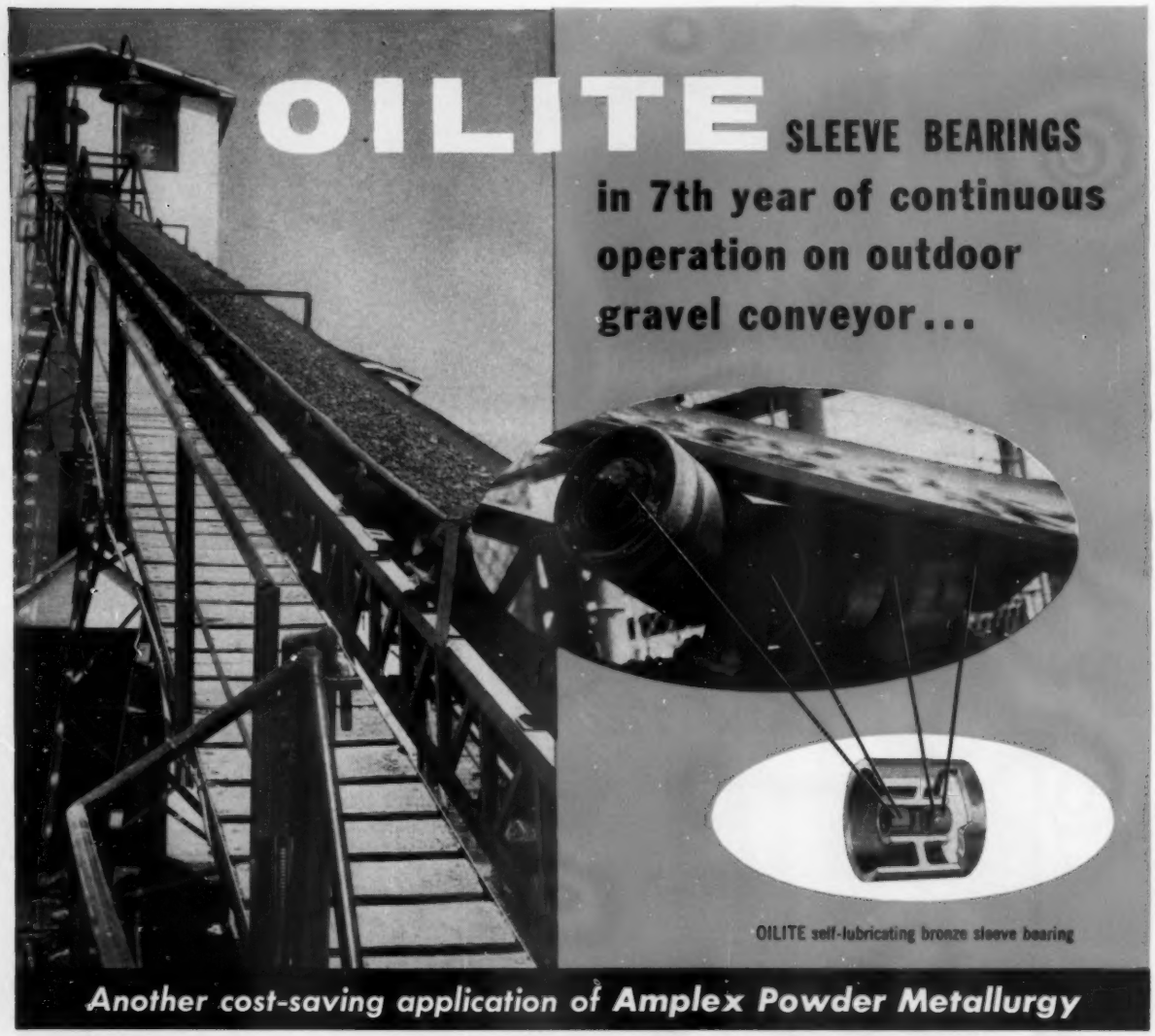
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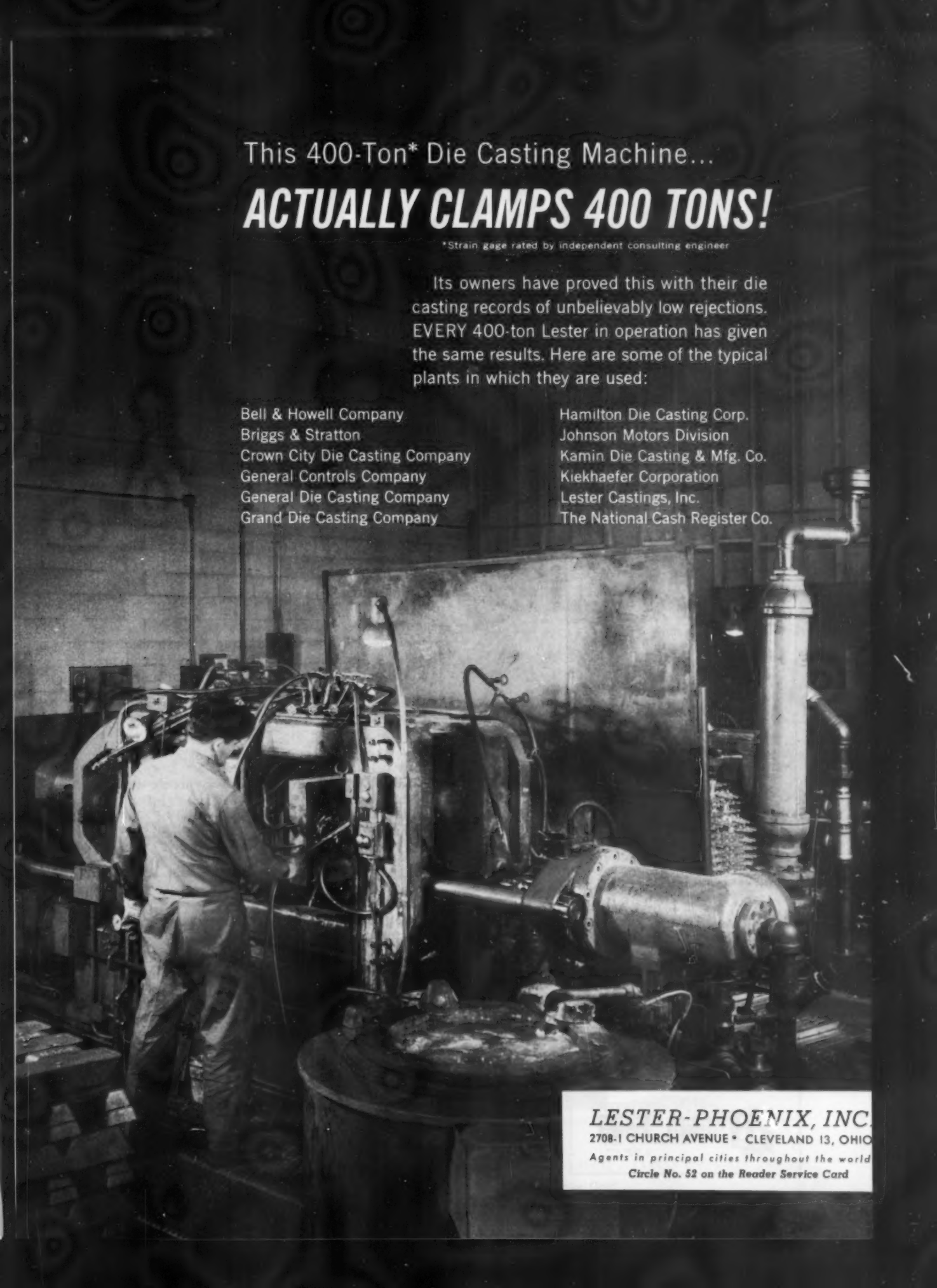

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BETWEEN THE LINES

the editor's viewpoint on articles in current and forthcoming issues

IT'S CHEAPER BY THE BARREL and we have the figures to prove it. Starting on page 52 is a report on the barrel finishing of PMM parts, complete with more than a dozen detailed case studies. The evidence is clear that bulk finishing in a barrel is far cheaper than hand methods. Examples include die castings, permanent mold gray iron and powdered metal.

HELPFUL HINTS FOR DESIGNING INVESTMENT CASTINGS start on page 44, with the third in our series of design pointers on PMM processes. Next month, there will be more of these to help you in detailing your castings, with a special section on coring out sections to gain improved casting properties and save metal.

COST REDUCTION PROGRAMS have occupied the attention of our editors lately, who have called on a number of manufacturers engaged in detailed cost studies. The first of these is presented starting on page 35 in this issue . . . Stromberg Carlson's cost reduction program for their telephone dial mechanisms. Other companies' cost reduction programs will be covered in future issues.

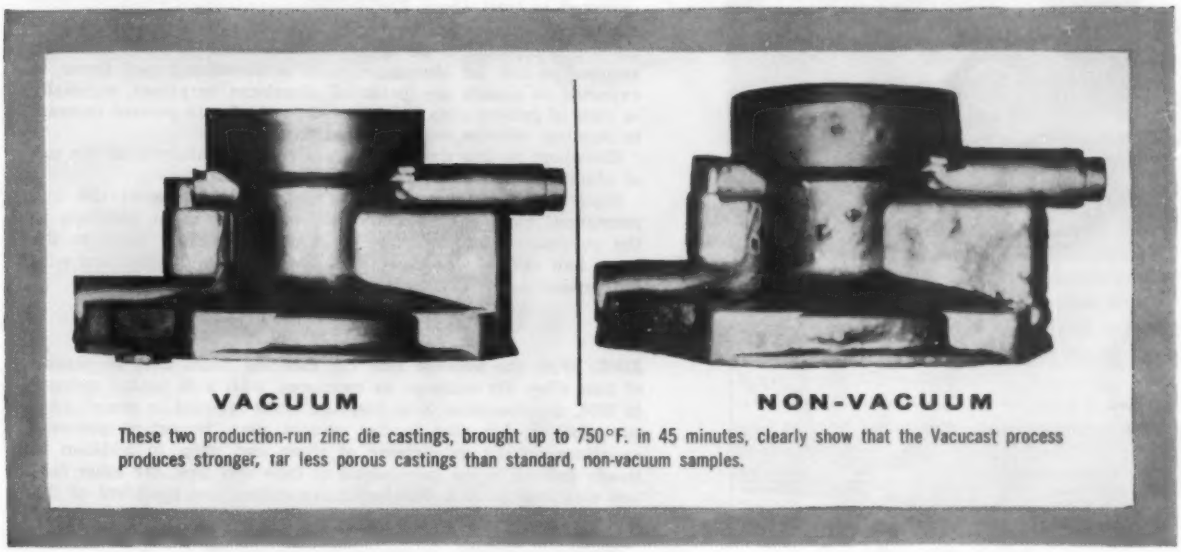
CAN YOU USE NICKEL POWDER? An exploratory article describing the characteristics and properties of a new nickel powder, and suggesting some of the important uses it is likely to find, will be another PMM "First" in the March issue.

UP-TO-DATE ABRASIVE BELT EQUIPMENT for finishing die castings will be presented pictorially in an industry round-up article in next month's PMM. There is a type of machine for every grinding, sanding, blending and clean-up job in your shop. Basic design and application data for each machine will help you evaluate it.

HOLES IN YOUR PLATING? You can easily check on the number, size and distribution of porosity in protective plating over metal surfaces with a simple X-ray setup developed by the National Bureau of Standards, detailed in this issue on page 51.

New Reed-Prentice Vacucast Process Gives

DENSER, STRONGER ZINC CASTINGS!



VACUUM NON-VACUUM

These two production-run zinc die castings, brought up to 750°F. in 45 minutes, clearly show that the Vacucast process produces stronger, far less porous castings than standard, non-vacuum samples.

Here's a big, new improvement in zinc die casting – the Reed-Prentice Vacucast system. Offered as original equipment *only* on REED die casters, this new vacuum casting process gives you higher quality castings than were ever possible before, and at a lower cost.

Exhaustive testing, conducted on Vacucast zinc castings by an independent testing laboratory, show the superiority of this new process. Here are some of the advantages you get with this new vacuum die casting operation:

- Up to 20% faster cycling
- Rejects cut by 50%
- Surface quality improvement greatly reduces polishing and buffing
- Increased hardness and strength, less permeability
- Porosity practically eliminated
- As much as .02" greater skin thickness in thin castings
- Big metal savings through permissible reduction in wall thickness
- Can use existing dies without alteration

ALUMINUM DIE CASTING TOO!

Now under final development and test – a new aluminum self-feeding Vacucast machine process. Watch for an announcement by Reed-Prentice for this newest engineering advancement.

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CASTING ABOUT

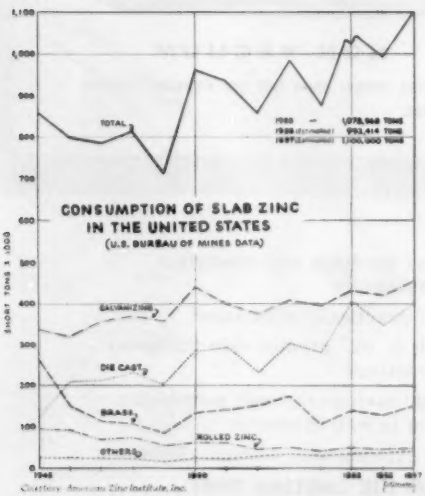
technical news of applications & processes involving precision metal moldings

THE METALS PICTURE IS BEING DRAWN now by hopeful companies and trade associations whose news bureaus are busily sending out forecasts for the coming year, along with their summaries of 1956 shipments. The way they see it, the metals supply situation shapes up something like this . . .

ALUMINUM: Supply has caught up with demand, says The Aluminum Association. Despite losses in the second half of the year due to strikes, U. S. primary aluminum production in 1956 was expected to total about 3,365,000,000 pounds, or 7.5 percent over the record primary production in 1955. Secondary aluminum production is reported to be up about 2 percent over 1955. Increased automotive use for aluminum, both in sheet and cast forms, is expected to absorb any potential aluminum surpluses, especially in view of general auto industry estimates of a 10 percent increase in number vehicles manufactured this year.

Elsewhere in this department is a complete analysis of the use of aluminum in America's 1957 automobiles.

Since much of secondary aluminum ingot goes to die and permanent mold casting foundries, which are large suppliers to the automotive industry, the production of remelt ingot in the latter half of 1956 was expected to show substantial increase with full production of 1957 models under way.



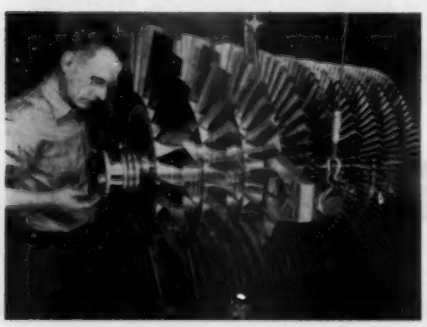
Courtesy American Zinc Institute, Inc.

ZINC: With the average 1957 car carrying more than 65 pounds of zinc alloy die castings, as compared with a 60 pound average in 1956, the American Zinc Institute looks forward to record consumption of slab zinc in the current year. Important potential expansion in the galvanizing of sheet and strip, in addition to steady growth in the galvanizing of tube and pipe, are other factors that lead John L. Kimberley, executive vice president of the AZI to predict that slab zinc consumption in 1957 may well exceed the record set in the industry's boom year of 1955 when total slab zinc consumed reached 1,078,968 tons.

Not only is the automotive field sparking the use of zinc die castings with more pounds per car, but other industries are following this example. New applications in appliances, business machines, builders hardware, tools and other products are pointed out.

Galvanizing of sheet and strip, Kimberley comments, shows great potential as a result of the steel industry's expanding use of continuous sheet galvanizing lines. Now 75% of galvanized sheet comes from 34 continuous lines . . . in a very short time, he says, this figure will exceed 90%. One new continuous line is now under construction and five more are being contemplated.

In 1956, with final figures not yet in, total domestic slab zinc consumption was about 993,000 tons, the second best year in the industry's history. Of this total, galvanizing accounted for 429,000 tons, die casting 359,000 tons and brass mills third with 121,000 tons estimated.

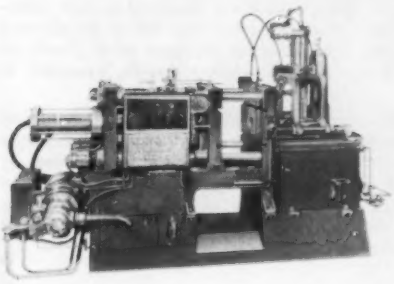


TITANIUM: Steeply declining price curves, record shattering production volume and very heavy capital equipment commitments that will more than double production in 1957 marked the 1956 titanium story. To support the industry's 1956 production of 10,600,000 pounds of finished mill products required an output of 23,000,000 pounds of ingot metal, according to T. W. Lippert, manager of sales and technical service, Titanium Metals Corporation of America. This, in turn, consumed some 20,000,000 pounds of the pure basic raw material, titanium sponge. The difference of 3,000,000 pounds represented the weight of alloy additions and recycling of titanium scrap.

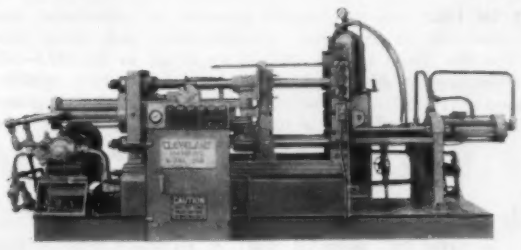
Continued on page 12

your answer to Profitable die casting production

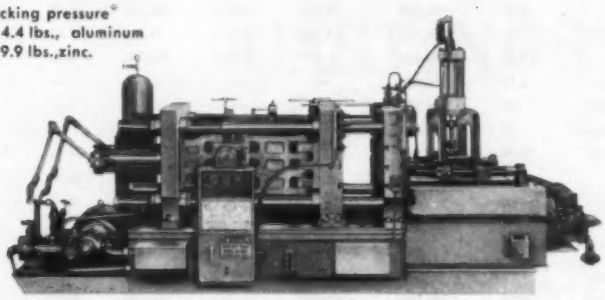
CLEVELANDS



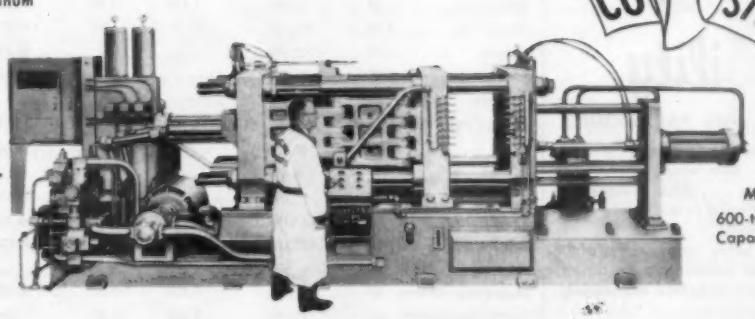
Model 50 Cleveland
50-ton locking pressure*
Capacity: 2.6 lbs., aluminum
5.4 lbs., zinc



Model 200 Cleveland
200-ton locking pressure*
Capacity: 4.4 lbs., aluminum
9.9 lbs.,zinc.



Model 400N Cleveland
400-ton locking pressure*
Capacity: 7.2 lbs., aluminum
14.5 lbs., zinc.



Model 600 Cleveland
600-ton locking pressure*
Capacity: 10 lbs., aluminum
25 lbs., zinc.

*Locking pressure strain gage tested.

Shown here are several models in the line of Cleveland Universal Hydraulic Die Casting Machines...each one a champion in its class! Whether the casting size is large or small, there's a Cleveland that will fit your production requirements exactly and give you castings of precision quality at a highly profitable rate.

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ALUMINUM ZINC MAGNESIUM

Paramount DIE CASTING COMPANY

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CASTING ABOUT

continued from page 10

TITANIUM—continued: Total sponge metal production in 1956 jumped ahead about 29,000,000 pounds, some 9,000,000 more than was required to support finished metal shipments. This excess sponge, of about $28,000,000 estimated market value, was blotted up by in-plant inventory build-ups and some governmental contractual purchasing.

COPPER: According to the Copper & Brass Research Association, the long-awaited development of a state of balance between world supply and demand for copper came into being during the past year. From all indications, the Association says, this condition can be expected to prevail for years to come.

Several factors in copper's future are said to make the possibility of serious copper shortages seem remote: greatly increased capacity is anticipated at new mine facilities scheduled for completion by 1962, with further expansion possible if needed. Continued exploration for new ore bodies is going on. And finally, the three-year labor agreements concluded at all major U. S. mines last year promise steady output from domestic sources.

PASSENGER CARS IN 1957 will use record amounts of aluminum, mainly the cast elements in automatic transmissions and other power-operated devices. Total use in 1957 is expected to be 247.5-million pounds, according to Aluminum Company of America, which has just released a tabulation of use of aluminum by various car manufacturers in 1957 (based upon a total of 6,500,000 passenger cars.)

			Average Car*		Automatic Transmission		
Car	Prod. (Percent of Total)	Est. Prod. (Cars)	Est. Prod. (Cars)	Alum. Usage (Pounds)	Est. Prod. (Cars)	Alum. Usage (Cars)	Combined Total**
Chevrolet 6	11.67	758,550	265,493	16.03	424,788	22.44	15,422,456
Chevrolet V8	16.80	1,092,000	382,200	20.37	611,520	26.78	26,941,278
Pontiac	5.85	380,250	19,012	15.42	247,163	36.42	13,620,565
Oldsmobile	7.51	488,150	1,464	10.61	76,640	41.43	21,554,927
Buick	9.21	598,650	21,551	21.86	307,706	43.27	25,846,268
Cadillac	2.32	150,800	—	—	—	—	8,767,512
Eldorado	.07	4,550	—	—	—	—	906,087
Brougham	.01	650	—	—	—	—	166,166
Total GM	53.44	3,473,600	689,720	18.61	1,667,817	30.82	113,225,259
Ford 6	2.81	182,650	63,928	18.61	96,804	35.98	5,469,646
Ford V8	20.59	1,338,350	468,423	22.14	709,325	39.51	44,802,730
Mercury	4.21	273,650	24,628	23.19	180,609	44.06	11,577,239
Lincoln	.83	53,950	—	—	10,790	57.69	3,204,306
Continental	.02	1,300	—	—	260	66.57	88,756
Total Ford	28.46	1,849,900	556,979	21.78	997,788	40.19	65,142,677
Plymouth 6	2 30	149,500	48,289	18.17	89,251	52.56	6,364,262
Plymouth V8	5.35	348,750	112,323	27.18	207,607	61.58	17,939,457
Dodge 6	.24	15,600	1,560	14.98	9,360	54.59	855,239
Dodge V8	3.18	206,700	20,670	21.94	124,020	61.55	12,770,546
DeSoto	1.74	113,100	—	—	45,240	83.28	10,367,651
Chrysler	1.48	96,200	—	—	28,860	91.87	9,779,307
Imperial	.32	20,800	—	—	—	—	2,684,864
Total Chrysler	14.61	949,650	182,842	24 10	504,338	63.53	60,761,326
Nash	.32	20,800	—	—	16,640	57.38	1,200,160
Hudson	.13	8,450	—	—	6,760	61.08	518,830
Rambler 6	.78	50,700	12,675	36.25	30,420	53.36	2,500,651
Rambler V8	.58	37,700	9,425	42.63	20,735	53.84	1,936,178
Total AMC	1.81	117,650	22,100	38.97	74,555	55.09	6,155,819
Packard	.25	16,250	—	—	16,250	32.88	534,300
Studebaker Champ.	.27	17,550	7,020	10.24	10,530	14.24	221,832
Studebaker Comm.	.54	35,100	3,510	15.47	31,590	19.47	669,357
Studebaker Pres.	.59	38,350	1,918	15.57	36,432	19.57	742,837
Golden Hawk	.03	1,950	—	—	1,950	26.35	51,383
Total S-P Corp.	1.68	109,200	12,448	12.54	96,752	21.33	2,219,709
Grand Total	100.00	6,500,000	1,464,089	20.76	3,341,250	38.82	247,504,790

38.08 lbs. aluminum per 1957 car.

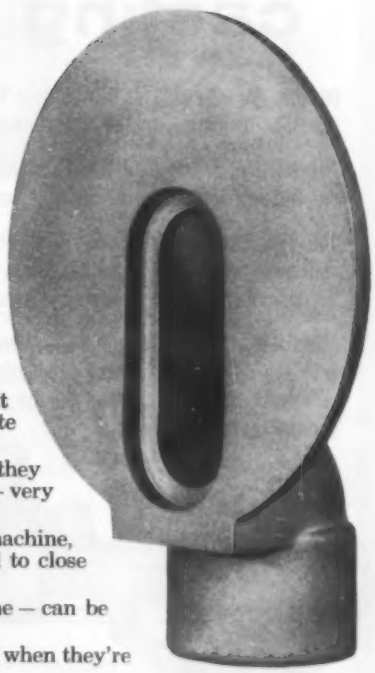
*Average car refers to composite car body model with aluminum weight distributed, but without automatic transmission, power brakes, or power steering.

**Including also power brakes and power steering.

from Crucible

Aircraft Quality STAINLESS INVESTMENT CASTINGS

in any shape or grade . . .



Can your product benefit from the important features shown in these Crucible Accumet® precision investment stainless castings? They are tube supports for jet aircraft engine assemblies, but the characteristics they illustrate are just as vital to thousands of other applications.

THIN WALLS — Accurately produced by the Accumet casting process, they are impossible to make in sand or shell mold castings — very difficult to forge.

BLIND HOLES — like this one, are impossible to forge, expensive to machine, and very difficult to sand cast . . . but they can be held to close tolerances by Accumet casting.

CORING — Deep or intricate cores — prohibitively costly to machine — can be economically produced by the Accumet process.

ODD SHAPED PARTS — difficult to chuck and machine, are economical when they're Accumet castings.

Next time your designs call for parts with intricate shapes . . . close tolerances . . . fine finish . . . high quality and uniformity, make them Crucible Accumet castings. They are available in any grade of steel or high alloy your product calls for. Let a Crucible engineer give you all the facts about how Accumet castings can save you time and money. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

Write for a free copy of the informative folder "Accumet Castings".

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

For more information circle No. 25 on the Reader Service Card

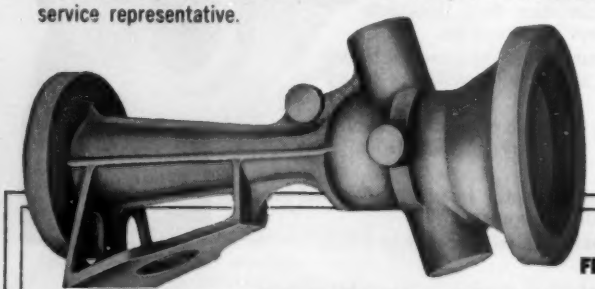
design hints for investment casting

DESIGN PARTS FOR THE SHAPE YOU WANT—Investment Casting can produce the most intricately shaped parts with little or no secondary machining required.

CHOOSE THE ALLOY YOU WANT—Investment Castings are produced in any of the ferrous or non-ferrous alloys, including magnesium.

USE THE PROCESS WISELY—Give full consideration to weight, dimensions, tolerances and surface finishes when designing for Investment Casting. Take full advantage of the economies inherent in the process.

CONSULT ARWOOD ENGINEERS—Arwood casting engineers will gladly consult with you on your design and production problems, helping you translate them into finished products. Write for the name of your nearest ARWOOD sales and service representative.



DESIGN FLEXIBILITY

Parts similar to this stainless steel valve body for an air flow controller often require several changes before design is finalized. Due to the relatively low cost of dies and die changes, the investment casting process has proven an inexpensive and flexible method.

ARWOOD

ARWOOD PRECISION CASTING CORP.

323 W. 44th St. • New York 36, N. Y.

Plants: Brooklyn, N. Y. • Groton, Conn. • Tilton, N. H. • Los Angeles, Calif.

"PIONEERS IN INVESTMENT CASTING"

For more information circle No. 9 on the Reader Service Card

CASTING ABOUT

continued from page 12

STAINLESS STEEL: One manufacturer of stainless, Allegheny Ludlum Steel Corp., points out in a news release that its 200 series of low-nickel stainless steels were produced at a rate 850 percent ahead of 1955 during the past year. With 1886 tons produced in 1955, the company boosted output to more than 18,000 tons in 1956. The 200 series is a chromium-nickel-manganese family of stainless steel using about one-half the nickel content of the more familiar 300 series.

Meanwhile, the stainless industry as a whole continued to ship at near record rate, despite a 34-day strike. During 1956, industry shipments are expected to have totalled 680,000 net tons of finished mill products, compared with the all-time high record of 686,000 net tons in 1955.

An industry survey shows that consumption of the stainless steels is diversified: 53.6 percent of volume going into industrial uses, 25.2 percent for consumer products, and 21.2 percent for all others. Stainless steel sales, the survey indicates, are more sensitive to capital equipment expenditures than to automotive production.

DIE CASTINGS: The outlook for 1957 is for 420,000 tons of zinc die castings and 450,000,000 pounds of aluminum die castings, says the American Die Casting Institute. Wider use of die castings in this year's cars, plus a substantial growth in non-automotive applications, gives rise to this optimistic prediction.

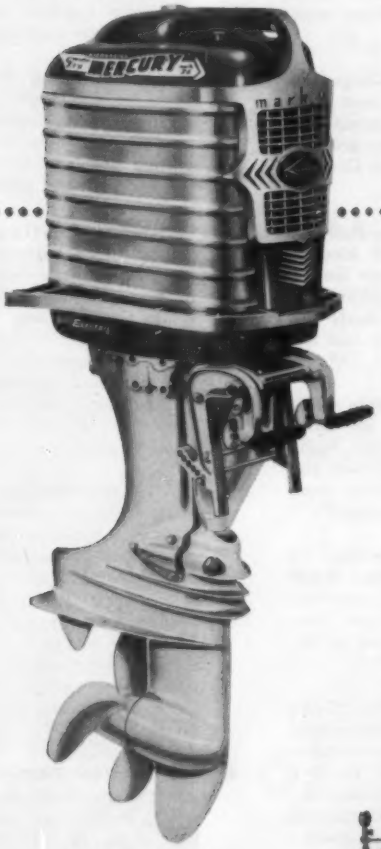
The Institute reports that 75 percent of all aluminum die castings come from job shops. Constantly increasing output from these shops, the ADCI says, will boost aluminum die casting production to over 750,000,000 pounds by 1960 . . . equivalent to ⅛ of all aluminum primary and secondary, and the equivalent of 15 percent of the market for primary aluminum.

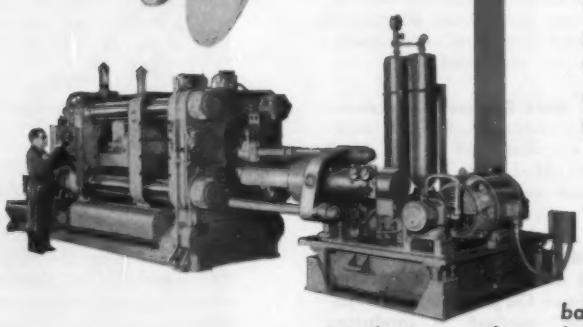
INVESTMENT CASTINGS: Sales of investment castings during 1957 may well reach a volume of $175,000,000 and could even top the $200,000,000 figure, according to a prediction by K. W. Thompson, president of the K. W. Thompson Tool Company and newly elected president of the Investment Casting Institute.

Even at the more modest figure, such a sales volume would show a 20 percent increase over total estimated 1956 sales of $148,000,000 and nearly a 100 percent increase over 1953 output. While the aircraft industry remains the principal consumer of these precision parts, commercial applications including electronic equipment, machine tools, business machines, machinery and others are responsible for booming the industry to new highs.

highest power

New 6 Cylinder 60 HP Mercury Combines New Speed with Great Load-Moving Power





slowest troll

New Mercury Trol-Twin Packs 10 Lively Horsepower, Yet Trolls At Super-Slow Speeds

Two great new product lines of the Kiekhaefer Corporation—designed for tomorrow and the big, booming pleasure market of a people that like to be outdoors. Here are power and control in a range of engines that fits every need.

Leading manufacturers everywhere are backed by H-P-M equipment. This is especially true in the production of new and exciting product lines where die castings are showing the way to lower costs. H-P-M's new line of die casting machines is matching the demand for better die castings everywhere. Have you really investigated what H-P-M has to offer?

HPM

THE HYDRAULIC PRESS MFG. CO.

Mount Gilead, Ohio, U.S.A.

A DIVISION OF KOEHRING COMPANY

1877—1957

For more information circle No. 42 on the Reader Service Card

DATA OFFERED IN THIS MONTH'S ADS

the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.

1. **Die Casting Supplies**—An illustrated bulletin from ACF Industries, Inc. describes their complete line of pots, castings, ingot molds, and goosenecks for the die casting industry.

2. **Colloidal Dispersions**—Bulletin 425 from Acheson Colloids Co. describes the different lubricants available for foundry use.

4. **Alloy Metal Powders**—The use of these powders in the fabrication of parts, and the properties of these parts, are covered in detailed reports from Alloy Metal Powders, Inc.

6. **Low Cost, High Speed**—die casting machines are described and all specifications given in a folder from the American Die Casting Machinery Co.

8. **Powder Metal Presses**—in four available sizes are described in technical data from Dorst Div. of Arnhold Ceramics, Inc.

14. **Induction Melting**—Bulletin 14 from Ajax Electrothermic Corp. describes their complete line of converter-operated induction furnaces for heating or melting metal in small quantities.

15. **Casting Equipment**—More than 2,000 pieces of rebuilt casting equipment are described in an illustrated catalog from AAA Machinery and Equipment Co.

16. **13 Models**—of die casting machines are described in bulletins from B & T Machinery Co. Machines range in capacity from 100 to 750 tons — for zinc, aluminum and brass.

20. **Metal Melting Facilities**—A new booklet describes the air and vacuum melting facilities available and the alloys and metal forms that can be supplied by Cannon-Muskegon Corp.

21. **Faster Die Set-Up**—that is also easier and safer is described in a catalog issued by Cast-Master, Inc.

23. **Powder Metal Bearings**—A 52-page manual offered by Chrysler Corp. Amplex Div. supplies engineering data and application information on powder metal bearings, parts, and filters made by the company.

25. **Investment Casting**—Important features of their Accumet process for producing stainless steel investment castings are presented in a new folder from Crucible Steel Co. of America.

28. **Vacuum Metallizing**—Bulletins issued by Consolidated Electrodynamics describe their line of vacuum coating equipment, headed by a 48-inch model for metallizing large pieces fast and at low cost.

31. **Die Assemblies**—Complete specifications and prices on time-saving die assemblies using standard cavity retainer sets and ejector boxes are available from Detroit Mold Engineering Co.

33. **Precision Dynamometers**—in 13 different capacities, from 0-500 to 0-100,000 pounds, are described in an illustrated brochure from W. C. Dillon & Co., Inc.

35. **Saves $5400**—Bulletin C-80 from Eclipse Fuel Engineering describes a new double-chamber dry-hearth-type metal melter for aluminum. Quality-improving and cost-saving advantages for both large and small operations are described.

37. **Shell Mold Casting**—Techniques and advantages of shell molding are described in the "G-E Shell-Molding Manual." The manual contains findings from G-E's shell-molding laboratory.

38. **Small Die Castings**—A fact-filled bulletin from Gries Reproducer Corp. explains the "Intercast" method of producing multiple-part zinc-alloy die cast units with moving elements.

39. **Proper Metal Selection**—Bulletin 116-205 issued by Hitchner Mfg. Co. tells how the right metal selection for investment castings can often increase efficiency and reduce costs.

44. **Zinc Base Alloys**—Booklet 27-Z prepared by Henning Bros. & Smith, Inc. gives engineering data, technical information, and recommended uses of zinc base alloys for die casting.

45. **Special Casting Problem?**—A brochure and other data offered by Investment Casting Co. are published to help solve special casting problems by using one-piece investment castings.

49. **Investment Casting Manual**—Important advantages of investment casting are described in a manual offered by Jelrus Precision Casting Corp.

51. **Steel Castings**—Complete descriptions and applications of the "Ceramicast" process for cast steel are offered by Lebanon Steel Foundry.

54. **Design Information**—Literature and design information on magnesium and aluminum alloy die castings is available from Litemetal Dicast, Inc.

58. **Standard Bearings**—National Molded Products, Inc. has issued a listing of standard size bushings and bearings carried in stock. Sizes, load data, etc. are given.

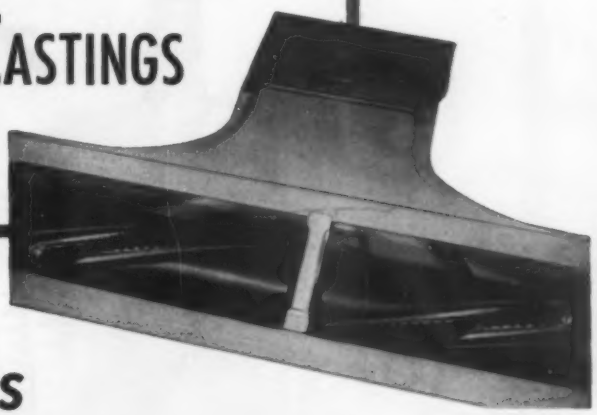
61. **Brass Powder Parts**—Detailed information on the design properties, production, and application of brass and other nonferrous powder parts is available from The New Jersey Zinc Co. Included are 20 case histories of brass and nickel silver powder structural parts.

63. **Die Casting Facilities**—A brochure has been prepared by the Paramount Die Casting Co. which describes the facilities of the company to produce die castings in a wide variety of designs.

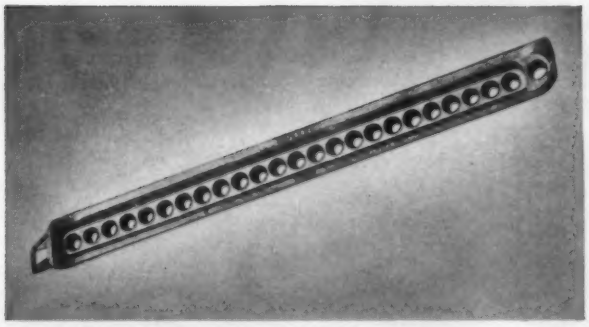
67. **Vacuum Die Casting**—Full information on the advantages of the "Vacucast" process for zinc die casting is available from Reed-Prentice Corp.

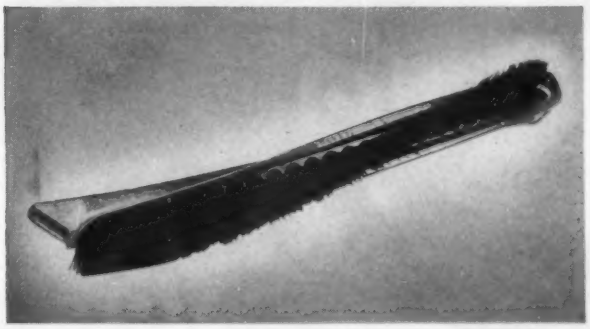
68. **Iron Powders**—Complete information on all of Republic Steel's three new grades of iron powder is given in booklet Adv. 763. Included is a description of the powders' "CDF" feature.

There's a Good Reason why **ZINC** DIE CASTINGS are so widely used



...at HOOVER ...IT'S **DUCTILITY**





The straight die casting (at top) is put into production without any machining. The bristles are fastened in place and the forming operation twists the bar to the proper curvature for installation on the agitator.

Design engineers at The Hoover Company found that DUCTILITY provided the necessary answer to their problem of using ZINC Die Castings in the agitator of the upright electric vacuum cleaner.

Because of the helical contour of the brush, the metal back could not be die cast to the required shape since the anchoring holes for the bristles would not be parallel to the motion of the die. The problem was neatly solved by a die caster who knew how to use the exceptional qualities of ZINC Die Castings.

The brush backs were cast straight, the bristles anchored in the holes and the castings were then cold formed approximately 115° to give the necessary helical contour. Even with the extra forming operation, die casting proved to be the most economical method of production since no machining was necessary.

Ductility is just one of the many physical and mechanical advantages that make ZINC Die Castings so widely used by manufacturers who want the best product with lowest costs of parts and assemblies.

ZINC
FOR DIE CASTING ALLOYS

THE NEW JERSEY ZINC COMPANY *160 Front Street, New York 38, N. Y.*

The research was done and the Zamak die casting alloys were developed with

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

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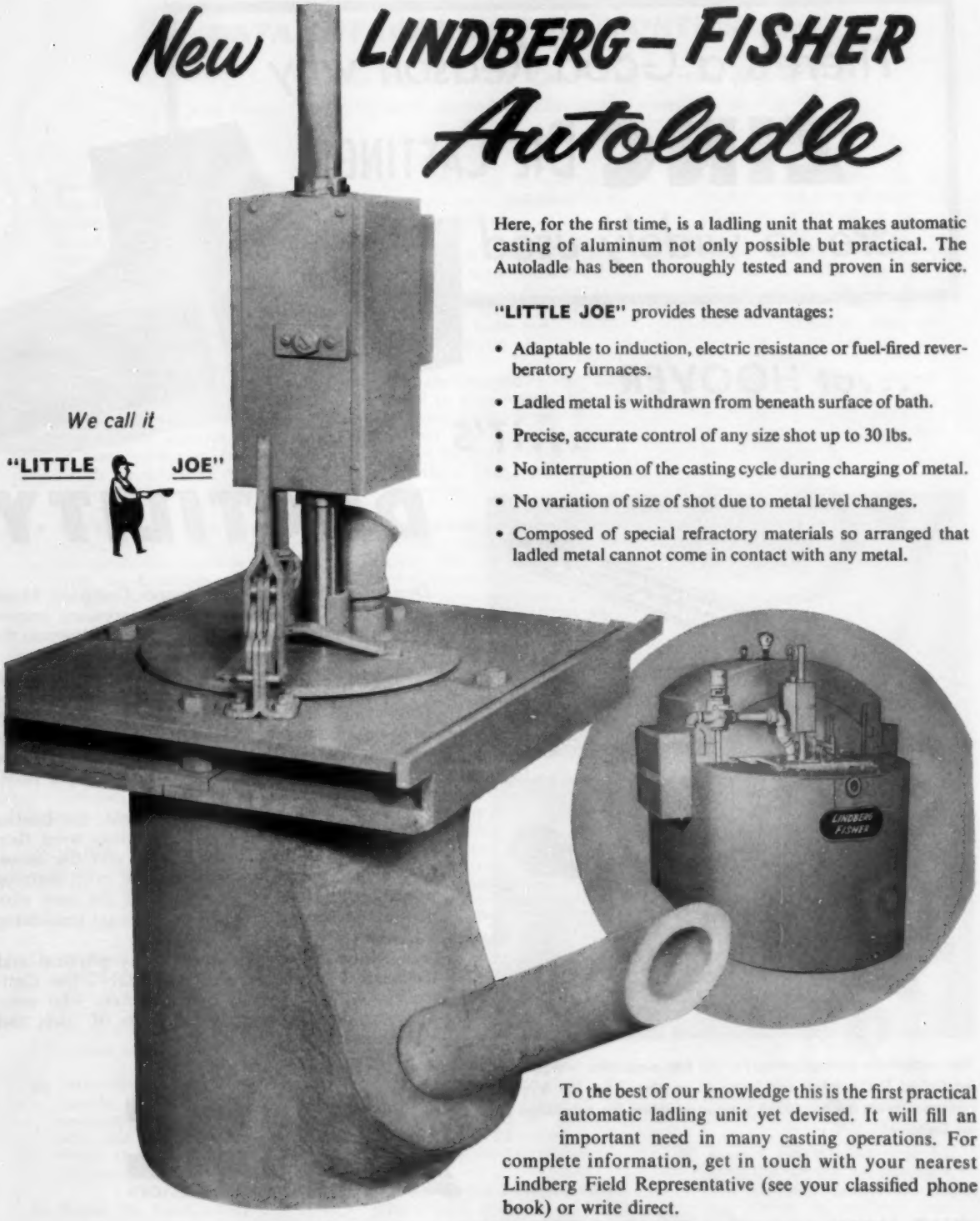
New LINDBERG–FISHER Autoladle



Here, for the first time, is a ladling unit that makes automatic casting of aluminum not only possible but practical. The Autoladle has been thoroughly tested and proven in service.

"LITTLE JOE" provides these advantages:

- Adaptable to induction, electric resistance or fuel-fired reverberatory furnaces.
- Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- No interruption of the casting cycle during charging of metal.
- No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.

To the best of our knowledge this is the first practical automatic ladling unit yet devised. It will fill an important need in many casting operations. For complete information, get in touch with your nearest Lindberg Field Representative (see your classified phone book) or write direct.

LINDBERG FISHER MELTING FURNACES

A Division of Lindberg Engineering Company, 2463 West Hubbard Street, Chicago 12, Illinois

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- ☐ Investment Castings
- ☐ Powder Metal Parts
- ☐ Permanent Mold Castings
- ☐ Plaster Mold Castings
- ☐ Shell Mold Castings
- ☐ None of these

Please type or print clearly **FEBRUARY, 1957 do not use after 5-15-57**

Name ..... *Position* .....

Company ..... *Kind of Business* .....

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City ..... *Zone* ..... *State* .....

Please send me information and literature on items circled below.

1	18	35	52	69	86	103	120	137	154	171	188	205	222	239	256	273	290
2	19	36	53	70	87	104	121	138	155	172	189	206	223	240	257	274	291
3	20	37	54	71	88	105	122	139	156	173	190	207	224	241	258	275	292
4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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3	20	37	54	71	88	105	122	139	156	173	190	207	224	241	258	275	292
4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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Significant examples are available which demonstrate the effective use made of the shell molding process by foundries. They verify definite improvement of product quality coupled with substantial savings in time, labor, and materials. Greatly reduced machining costs alone (in some cases eliminated entirely) through the application of Plenco shell molding resins make it well worth your while to consult with us.

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Now available are:

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VACUUM-MELTED ALLOYS
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METALLURGICAL SPECIALISTS

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DATA IN ADS

continued from page 16

69. Heat Control—Bulletin 1.1K5 from the Ross Heat Exchanger Div. of American-Standard gives detailed information on the Ross Exchanger way of safeguarding hydraulic systems from overheating dangers.

72. Filtration Guide—Better, faster, cost-cutting filtration is described in a booklet issued by Sel-Rex Corp. Filter Div. It is entitled "Guide to Better Filtration."

76. Barrel Finishing—Latest information on the "Abbott method" of barrel finishing is contained in a new booklet offered by the Abbott Ball Co. Equipment, material, and their use are described, and the company's new welded steel barrel is introduced.

77. Finishing Non-Ferrous Metals—Detailed laboratory and engineering reports on the finishing of non-ferrous metals by the "Iridite" process are available from Allied Research Products, Inc.

79. Zinc Plate Coating—Data sheets and prices are available from The Chemical Corp. on their new "Luster-on 52" single-dip, no-leach conversion coating for zinc plated surfaces.

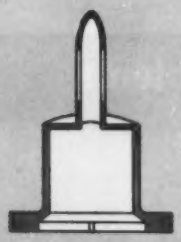
81. Barrel Finishing Compounds—A complete chart and data file on the proper barrel finishing compound for almost any part or material has been released by Esbec Barrel Finishing Corp.

83. New Finishing Process—Complete information is available from Grav-I-Flo Corp. on their new "Spin-Finish" process, said to replace hand and automatic buffing.

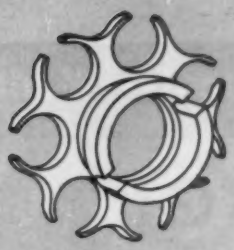
84. Germanium Rectifiers—A complete catalog is offered by Hanson-Van Winkle-Munning Co. describing their new line of "Powertron" germanium rectifiers, available in three models.

86. Double Spindle Lathes—Hammond Machinery Builders has issued a catalog on their line of double spindle lathes, featuring a separate motor, control, and variable speed drive for each operator.

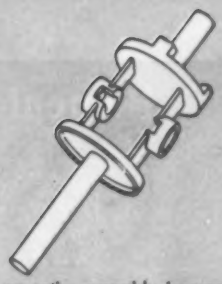
Continued on page 104



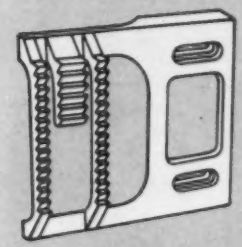
Here is an example of the complex internal coring possible with investment casting. Square, round, elliptical or irregular interiors can be cast.



The complexity of this part makes investment casting the only feasible method of manufacture. Prongs have perfect dimensional accuracy.



Here an entire assembly incorporating multiple functions is cast in one unit. "Keyhole" coring and a number of distinct surface details are required.

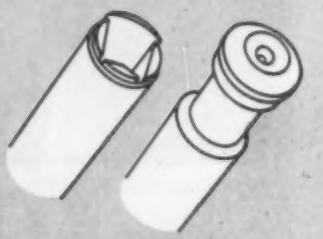


The sharp teeth of this sewing machine feed dog were cast in wear-resistant alloy to give longer wear than could be obtained from machinable material.

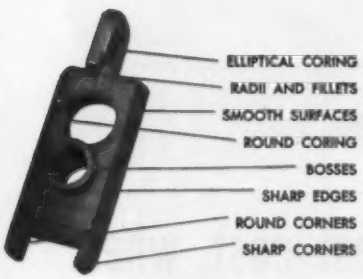
design with austenal in mind

In planning parts, design directly for Microcast and take advantage of its wide range of design possibilities.

See not only what you can do, but what costly, time-consuming operations Austenal investment casting eliminates.

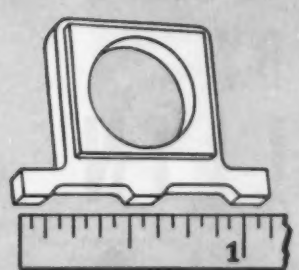


Cross-sections of irregular and varying thickness can be utilized. In this part the internal core diminishes from an irregular square to a small round hole.

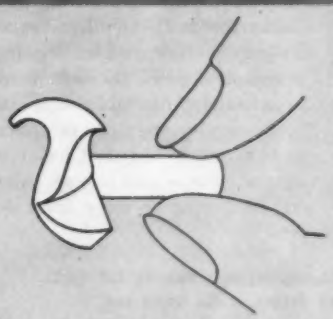


These extrusion dies of wear-resistant alloy are readily mass-produced with highly complex and irregular internal contouring.

Walls of varying cross-sections are possible. Here wall thicknesses change from thin to very heavy, allowing strength without bulk.



This very small part measures 1⅛" wide and less than ⅛" thick. Its thinness, rigidity and detail were possible only by investment casting.



Shown here is an example of how investment casting can virtually eliminate hand-filing and machining by keeping uniform, intricate detail.

This large complex gimbal was cast to include many details on the internal and external surfaces.

Design problem?

Call your Austenal representative and ask him to show you how Microcast can help you.

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microcast division

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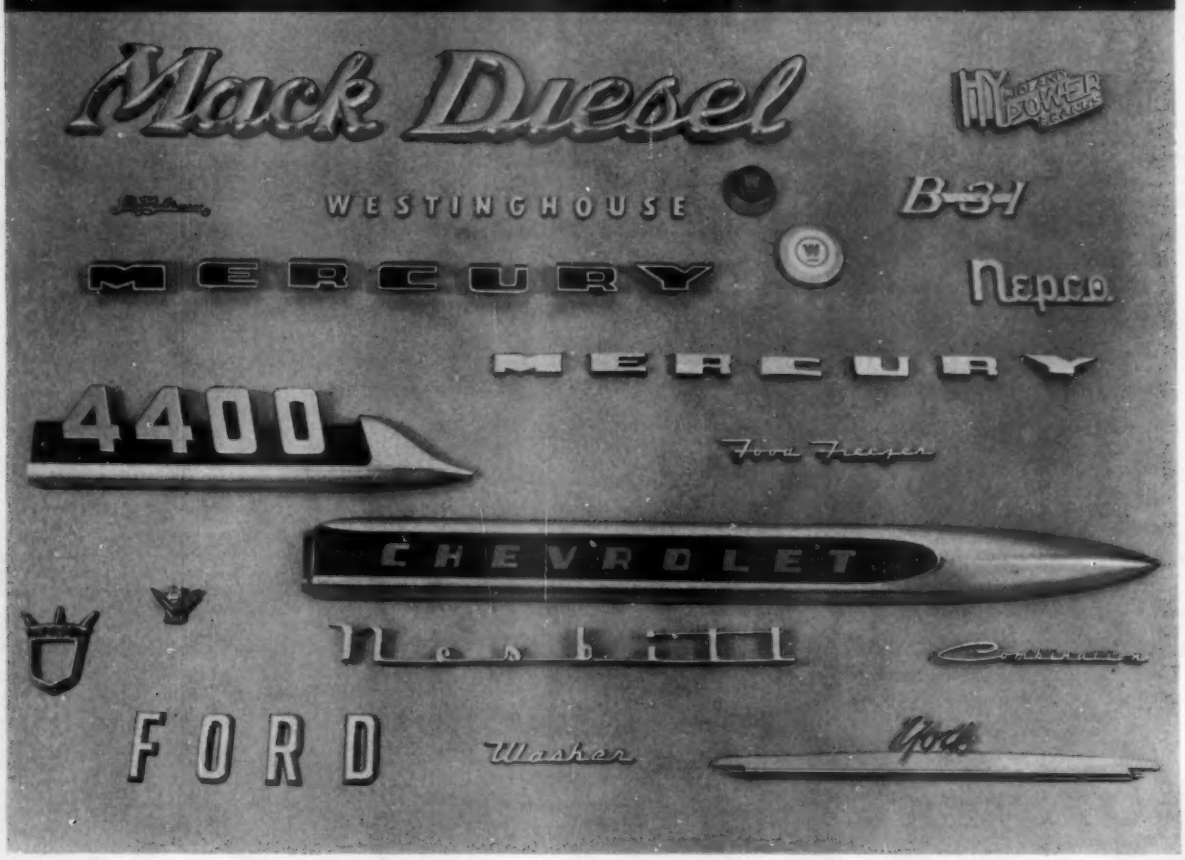

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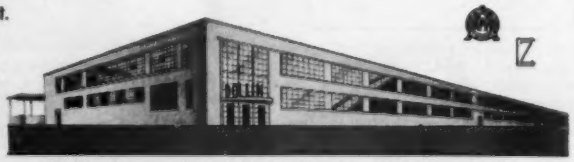
Hundreds of America's leading brands and products are attractively identified with Dollin zinc die-cast trademarks and ornaments. The great versatility of Dollin die-casting reproduces the full character and beauty of any design—whether massive or delicately intricate.

Dollin die-casting keeps costs low because parts are cast in a single operation—or with a minimum of secondary operations—at high production speeds. Dollin will carry your designs right through from drawings to complete parts, delivered ready for assembly. Available with cast holes—or with studs, cast or driven, smooth or threaded. Choice of chrome, brass or gold plating, painting, lacquering or other finish desired.

Send us drawings or samples of your nameplates or ornaments. Let Dollin engineers get the most out of your designs, at the lowest cost.



DOLLIN Zinc & Aluminum DIE-CASTINGS

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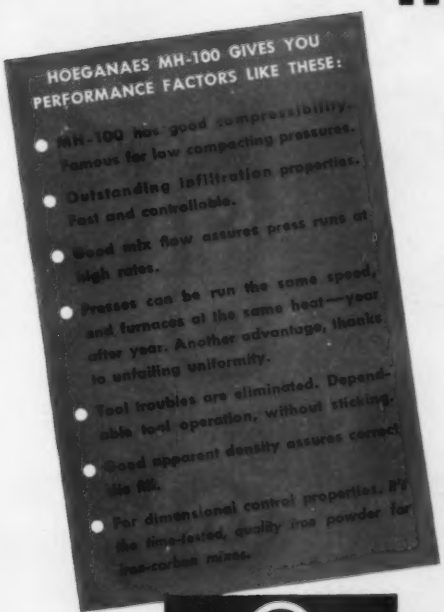
OF ALL METAL PARTS FABRICATORS USING HOEGANAES MH-100 DURING THE PERIOD 1946-1950

79%* ARE STILL USING MH-100 today!


HOEGANAES MH-100 GIVES YOU PERFORMANCE FACTORS LIKE THESE:
• MH-100 has good compressibility. Famous for low compacting pressures.
• Outstanding infiltration properties. Fast and controllable.
• Good mix flow assures press runs at high rates.
• Presses can be run the same speed, and furnaces at the same heat—year after year. Another advantage, thanks to unfailing uniformity.
• Tool troubles are eliminated. Dependable tool operation, without sticking.
• Good apparent density assures correct die fill.
• For dimensional control properties, it's the time-tested, quality iron powder for low-carbon mixes.

why?

Compared to 1946-1950, today is mighty competitive in the metal powders industry. Yet, 79% of those who started to use MH-100 in those non-competitive days are still specifying what is known as the "Blue Line" powder.

Why? What is the answer? It's performance . . . *outstanding performance!* Benefits . . . *user benefits!* The leading benefit, which every powder metallurgist rates high on his list, is *uniformity.* That's what you can expect, uniformity from month to month . . . uniformity from year to year. In fact, Hoeganaes MH-100 uniform properties enable you to mix a batch today and match the properties of a mix of ten years ago.

Now produced in the Hoeganaes Riverton, N. J. plant. And plans are already underway to add facilities to greatly increase production for today's increasing demands . . . and the greater demands of the future.

There's a Hoeganaes metal-powders-specialist just a short phone call away. When it comes to powder metallurgy troubles, you'll find he's a good man to know.

*96%, however, of this customer group are still using MH-100 or other grades of Hoeganaes Sponge Iron Powders.

HOEGANAES

Sales Representatives in Principal Cities
Atlanta (Decatur, Ga.)
Birmingham, Ala.
Chicago, Ill.
Cincinnati, Ohio
Cleveland (Fostoria, Ohio)
Minneapolis, Minn.
New England (Elmira, N.Y.)
Philadelphia (Riverton, N. J.)
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HOEGANAES SPONGE IRON CORPORATION

Manufacturer of sponge iron, stainless steel, and special alloy powders for powder metallurgy, cutting and scarfing, chemical field, plastic industry, atomic energy, welding electrodes, and other industrial uses.

General Offices and Plant • RIVERTON, NEW JERSEY

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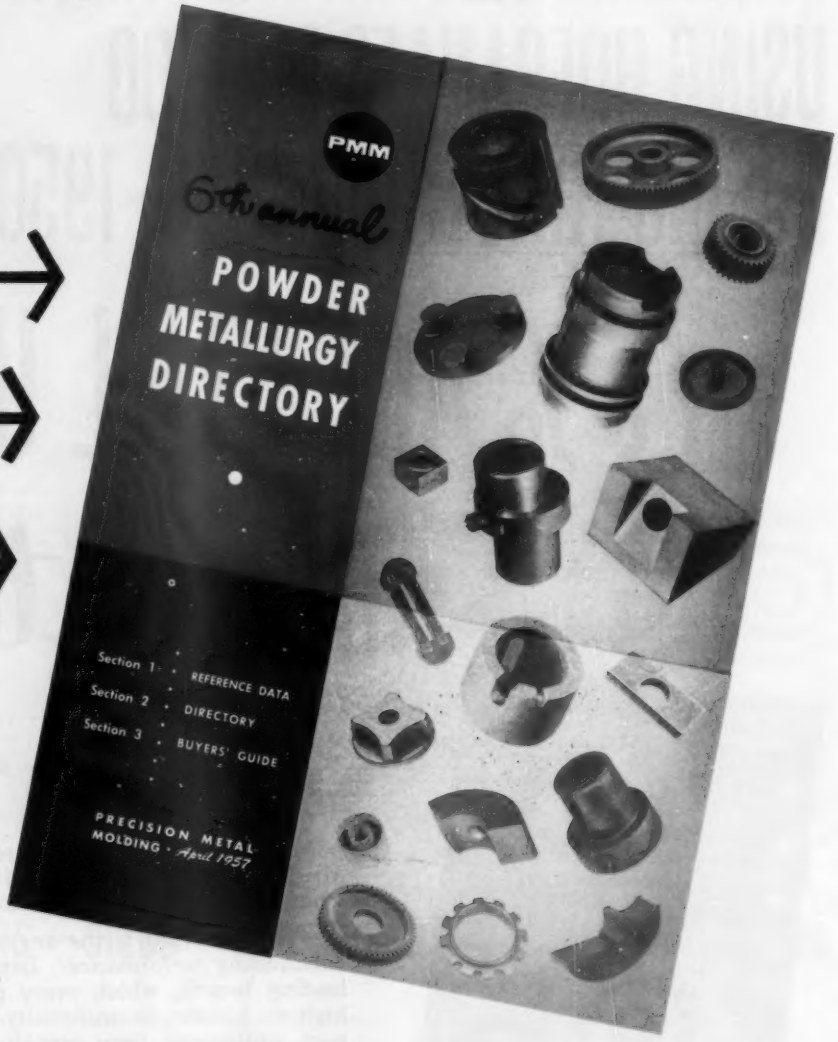


. . . you'll be using this for reference

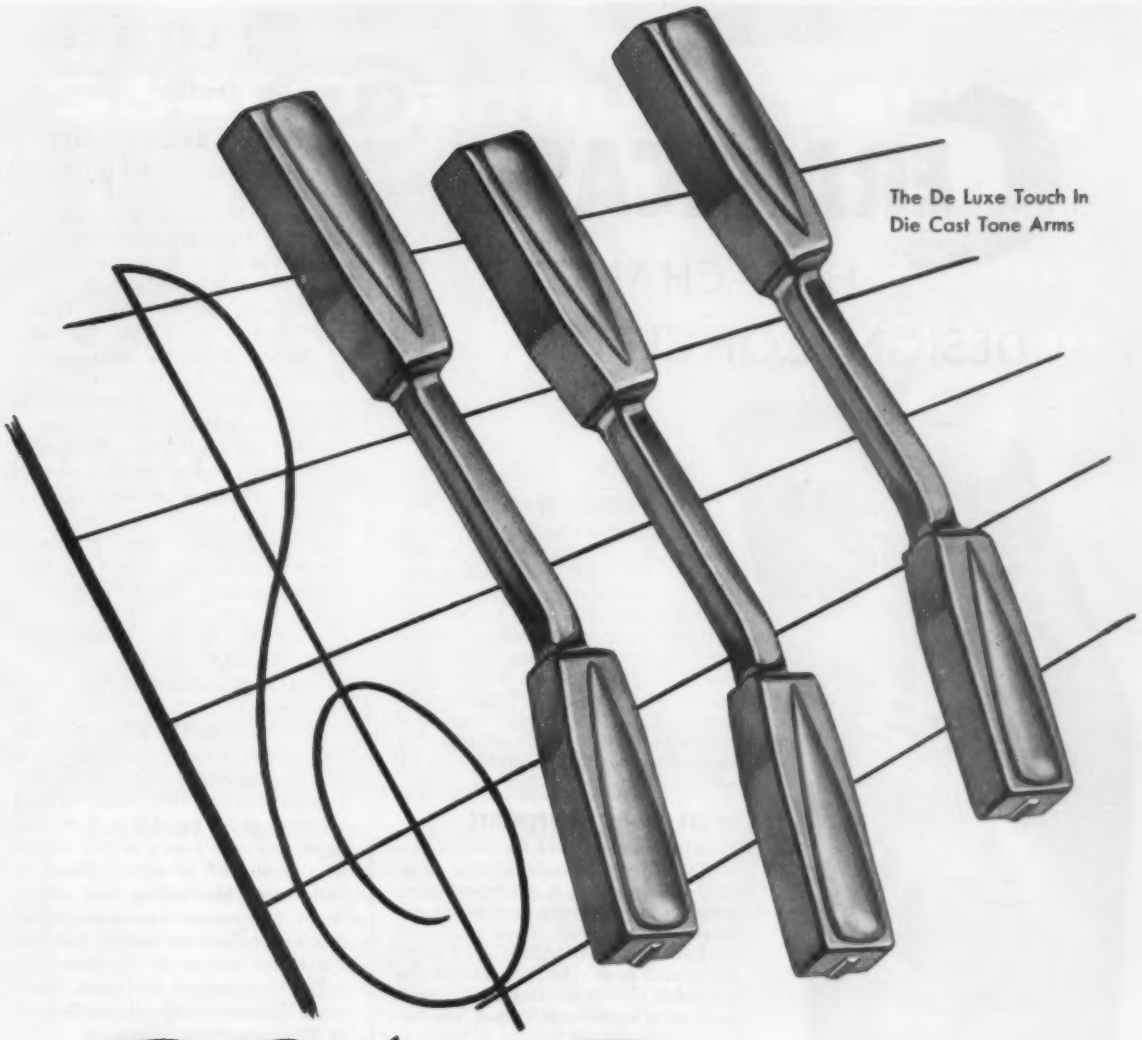
. . . *when you want to locate a supplier.* Every company in the industry is listed. So are all the products and services. Both are arranged in the Directory and Buyer's Guide Section for quick and easy reference. Here is a source book for your every powder metallurgy need.

. . . *when you need technical facts.* Exclusive PMM data sheets show typical properties of powder metal parts and characteristics of metal powders. Also, complete MPA guide to all standards pertaining to metal powders, powder metal parts . . . The Directory Reference Section is full of comparative data you'll want at your finger-tips all year long, whether you're designing, producing or buying powder metal products.

. . . *when any powder metallurgy question arises.* Here's the basic data for the entire powder metallurgy industry, organized and presented for your year 'round use.

MEMO TO ADVERTISERS:

If you sell Powder Metal Parts, Powder, or Powder Metallurgy Equipment, don't miss this 6th Annual Powder Metallurgy Directory! Publishing date: April, 1957 issue of PRECISION METAL MOLDING. Closing date: March 1, 1957



The De Luxe Touch In
Die Cast Tone Arms

The De Luxe Touch—

TEMPERED BY A LOW COST PROCESS WITH MADISON-KIPP ZINC AND ALUMINUM DIE CASTINGS

The designer of quality products must watch his costs vigilantly to avoid drastically reducing his market potential pricewise.

Fortunately, the "DeLuxe Touch" is available without cost penalty and usually at a big saving by utilizing the die casting process.

Full process utilization, however, is the telling factor. It is available at Madison-Kipp where the rare mechanical skills required, are predominant and seasoned.

Please clip this ad as a reminder to contact us when you have die casting requirements.

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MADISON-KIPP CORPORATION
213 WAUBESA STREET • MADISON 10, WIS., U.S.A.

Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

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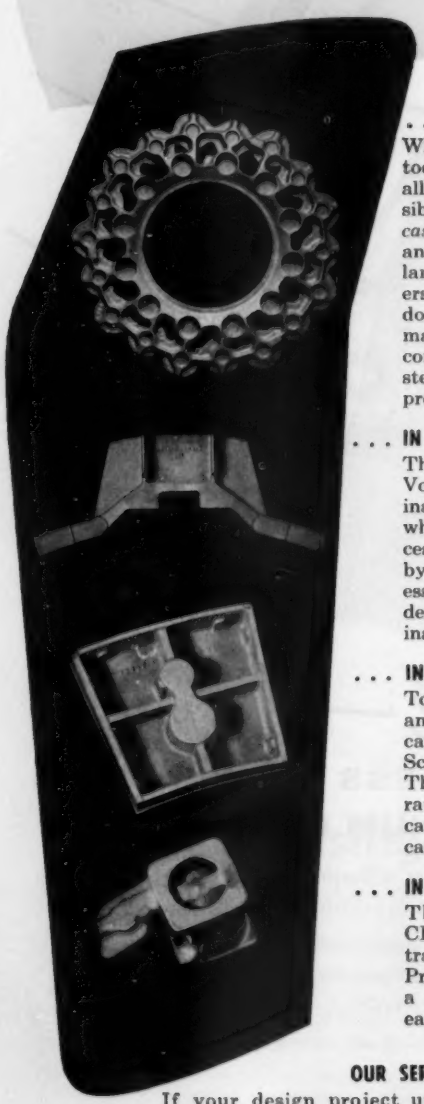
CERAMICAST* HAS CHANGED DESIGN CONCEPTS . . .



. . . IN AIRCRAFT BRAKE SYSTEMS

When aircraft landing speeds became too fast for braking systems of light alloys, CERAMICAST made it possible to produce backing plates in *cast steel* that will stand the stresses and high temperatures placed on the landing gear of today's super bombers and fighters when they "touch down." Backing plate designs of six major U.S. aircraft have now been converted from light alloys to the cast steel of Lebanon's CERAMICAST process.

. . . IN JET ENGINE COMPONENTS

This jet removal track for the Chance Vought F8U-1 *Crusader* was originally designed as a machined part, which made quantity production excessively expensive. Now produced by Lebanon's CERAMICAST process in cast steel, the part retains the desirable characteristics of the original, at a considerable cost saving.

. . . IN THE BOTTLING INDUSTRY

To produce the surface smoothness and close tolerances of this bottling cap guide, engineers at Pneumatic Scale Co. specified CERAMICAST. The thin metal sections and accurately recessed pockets are significant advantages of Lebanon's new casting process.

. . . IN AIRCRAFT FUEL SYSTEMS

The unique advantages of the CERAMICAST process are illustrated in this jet engine fuel valve. Practically impossible to produce as a sand casting, this component is easily adaptable to CERAMICAST.

OUR SERVICE TO YOU

If your design project utilizes cast steel in any form, CERAMICAST may provide quality and cost advantages. Let our engineers discuss the process with you and its applicability to your problems. Write for complete descriptions and applications of the CERAMICAST process.

* CERAMICAST is a registered trademark

CIRCLE L

LEBANON STEEL FOUNDRY

168 LEHMAN STREET LEBANON, PENNSYLVANIA

CARBON, LOW ALLOY AND STAINLESS STEEL CASTINGS

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PMM LETTERS

the readers' forum

BOUND BACK COPIES

I have saved all the copies and have them on file, of the Die Castings Magazine since its beginning. They are in 3-ring binders, a year to a binder, which cost us in the neighborhood of $3.50 each. Do you know if any organization would be interested in having these for the price of the binders? I find that I have so many files of this sort that it is necessary to thin them out.—G.C.C. (General Sales Manager)

If any of our readers would like to add these to their library, write directly to Gordon C. Curry, General Sales Manager, Precision Castings Co., Inc., Syracuse 1, N. Y.—Ed.

I am writing to request your permission to reproduce statistical information from page 61 of the September, 1956, issue of PRECISION METAL MOLDING. These statistics on the "sale of die casting machines in the United States, 1952-1956" would be used as an exhibit in a mimeographed case study which would be distributed to my students in Industrial Marketing for classroom purposes. An appropriate footnote reference would indicate the exact source of the material. —E.R.C. associate professor, Harvard University, Graduate School of Business Administration.

We are always glad to grant permission to reproduce articles. —Ed.

Upon reading your December issue of PRECISION METAL MOLDING, I have run across part No. 6, entitled "Die Design For Heat Control". This article was written by Mr. W. M. Halliday. This article is quite practical and to the point.

I should appreciate receiving tear sheets on parts No. 1 to 5 if this is at all possible.—LCS,

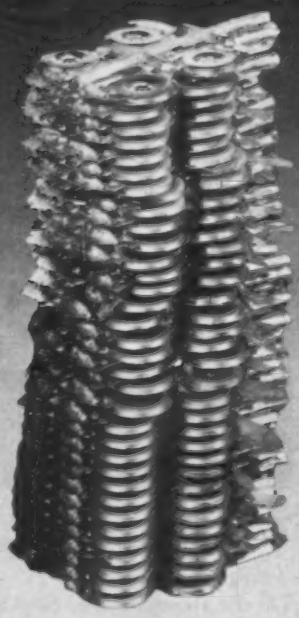
Material requested sent.—Ed.

We manufacture aluminum caster housing for 8" and 5" wheels for use on our own scaffolds. We would be interested in talking with the Sales Manager of the West Coast customer whose letter appeared in your November issue asking for a manufacturer of aluminum caster housing.—NTP—Factory Manager.

$5400 annual saving

by $4200 investment in ECLIPSE FURNACE

New Double-Chamber Dry-Hearth-Type Metal Melter Proves Flexibility in Small Shop



Increases Production . . . Eliminates Rejects

● The new Eclipse double-chamber dry-hearth-type metal melter—actually a new method—replaced two crucibles and one reverberatory furnace at Le Claire Manufacturing Co., Le Claire, Iowa, and has paid for itself at the rate of $450 a month in savings! The new melter combines advantages of Eclipse direct firing with the first truly separate melting and holding chambers. At Le Claire, the one dry-hearth melter has made this remarkable record supplying all metal for the plant's sand- and die-cast aluminum casting operations. Castings for power mowers, electric and gas motors, as well as many others, are cast from this one furnace. Actually designed for high-production operation, the melter gives even better results in larger foundries.

Pigs are melted on a steep sloping hearth which gives fast run-off of molten metal to the holding chamber. Gassing and agitation of the metal in holding chamber are eliminated because no cold metal enters the bath. Direct firing permits faster, more efficient heating, requires less fuel. All moisture is driven off while metal is melting . . . all oxide inclusions are deposited on surface of hearth where they are easily removed by raking. Hearth and holding chamber are separately heated and controlled for ideal melting and pouring temperatures. And there are more additional quality-improving and cost-saving advantages for your *large or small* operation than can even be suggested here! Write *today* for . . .

Bulletin C-80 →

Eclipse®

ECLIPSE FUEL ENGINEERING CO.

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ECLIPSE FUEL ENGINEERING CO. OF CANADA, LTD., 20 UPJOHN ROAD, DON MILLS, ONTARIO

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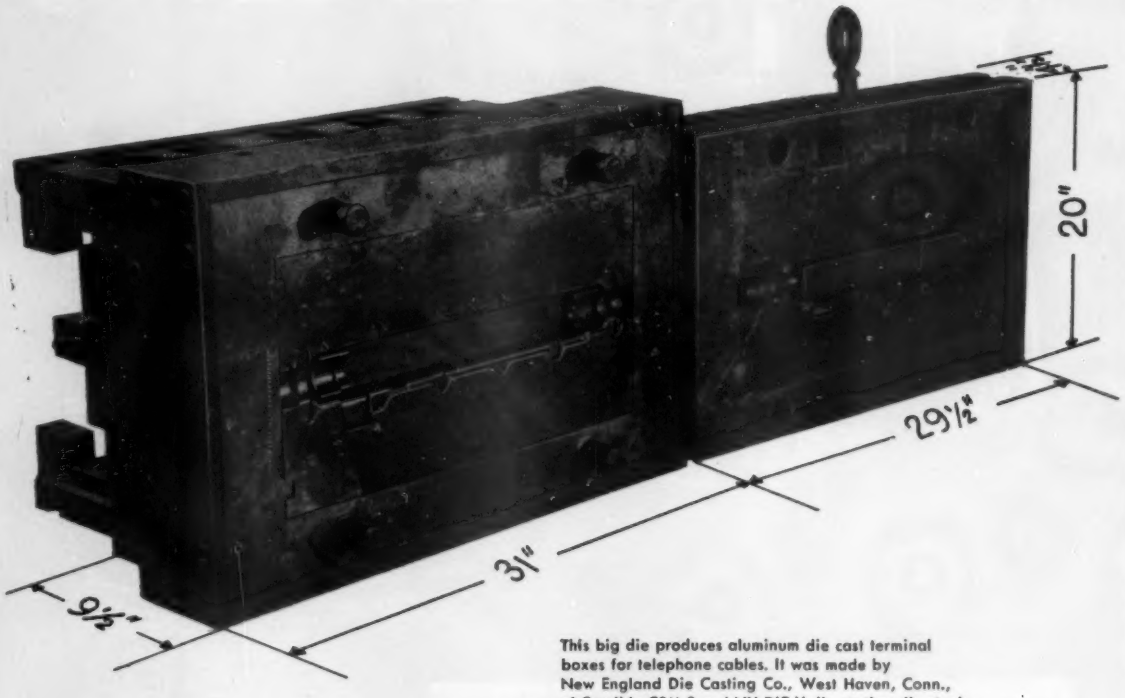
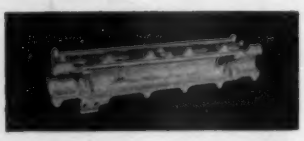


This big die produces aluminum die cast terminal boxes for telephone cables. It was made by New England Die Casting Co., West Haven, Conn., of Crucible CSM 2 and NU DIE V die casting die steels.

it's made of

ultrasonically inspected



CSM 2 and NU DIE V

...from Crucible warehouse stock

The die above, built by New England Die Casting Company, West Haven, Connecticut, casts aluminum electrical terminal boxes. The holder block is prehardened CSM 2 – the insert NU DIE V – both promptly obtained from local Crucible warehouse stocks.

Crucible CSM 2 and NU DIE V are made for and inspected to die casting steel quality. They're an unbeatable combination – perfect for holder blocks, solid dies, inserts or sleeves – for any die casting application.

What's more, delivery is from local warehouse stock – in 438 sizes – 1" to 40" wide . . . ¾" to 15" thick – all ultrasonically inspected. You just can't beat Crucible die steels for quality or availability. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

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PMM PATENTS

Copies of all patents reviewed can be secured from U. S. Patent Office, Dept. of Commerce, Washington, D. C. for 25¢ each.

A SURFACE TREATING process particularly for castings of the light metals. The surface of the casting to be treated is blasted with metallic shapes such as shot, grit, slugs, etc. made from an alloy of light weight metal consisting predominently of aluminum in an amount no less than 80% of the total weight of the alloy.

U. S. Patent No. 2,773,339 — Process For The Surface Treatment Of Light Alloy Components, More Particularly For The Abrasive Blast Treatment Of Light Alloy Castings—Fritz Nikolaus Bischoff and Hans Paul Haberlin — assigned to Georg Fischer Aktiengelschaft — issued Dec. 11, 1956.

A METHOD FOR PURIFYING HYDROGEN in which the hydrogen mixed with other gases is brought in contact with one side of a thin, non-porous film of a silver-palladium alloy. The hydrogen permeates through the alloy film and is collected on the opposite side.

U. S. Patent No. 2,773,661—Silver-Palladium Film For Separation And Purification Of Hydrogen—James B. Hunter—assigned to The Atlantic Refining Co.—issued Dec. 11, 1956.

A METHOD OF CASTING nickel base alloys containing aluminum and/or titanium so that inclusions of aluminum and titanium oxides and nitrides are not present. The alloy is melted and poured in an inert atmosphere consisting essentially of a mixture of an inert gas and dichlorodifluoromethane.

U. S. Patent No. 2,770,860—Casting Readily Oxidizable Alloys—Fred J. Webbere—assigned to General Motors Corp.—issued Nov. 20, 1956.

A SHELL MOLD SUPPORT to be used during pouring of metal. The support consists of a base plate with two mold supporting plates mounted on it. One of the supporting plates is movable along the base and both of the supports are equipped with a plurality of projections of varying length arranged to bear against the shell mold. In use, a shell mold is placed between the support plates so that the projections support both sides of the shell mold.

U. S. Patent No. 2,770,858—Supporting Shell Molds During Metal Pouring Operations—Arthur J. Anderson—assigned to General Motors Corp.—issued Nov. 20, 1956.

Continued on page 66

8 reasons

why you should switch to

UCON

brand hydrolubes

Carbide's Safety hydraulic fluids

1) The *fire-resistance* of water-base Ucon Hydrolubes has been proved by years of severe, exhaustive laboratory tests. In actual service, Ucon hydrolubes have prevented serious fires and injuries during more than eight years of routine use.

2) Ucon Hydrolubes have *no harmful effects* on packings and seals. Leakage losses are often lower than with other hydraulic fluids.

3) Ucon Hydrolubes can be *safely handled* by workmen.

4) Ucon Hydrolubes are made in *three standard viscosity grades*—200, 300, and 550 S.U.S. at 100°F. Other grades can be supplied to fit specific needs.

5) Ucon Hydrolubes have *high viscosity indexes*—150 to 160.

6) Ucon Hydrolubes are *good lubricants*. Special anti-wear agents provide satisfactory pump life and performance characteristics.

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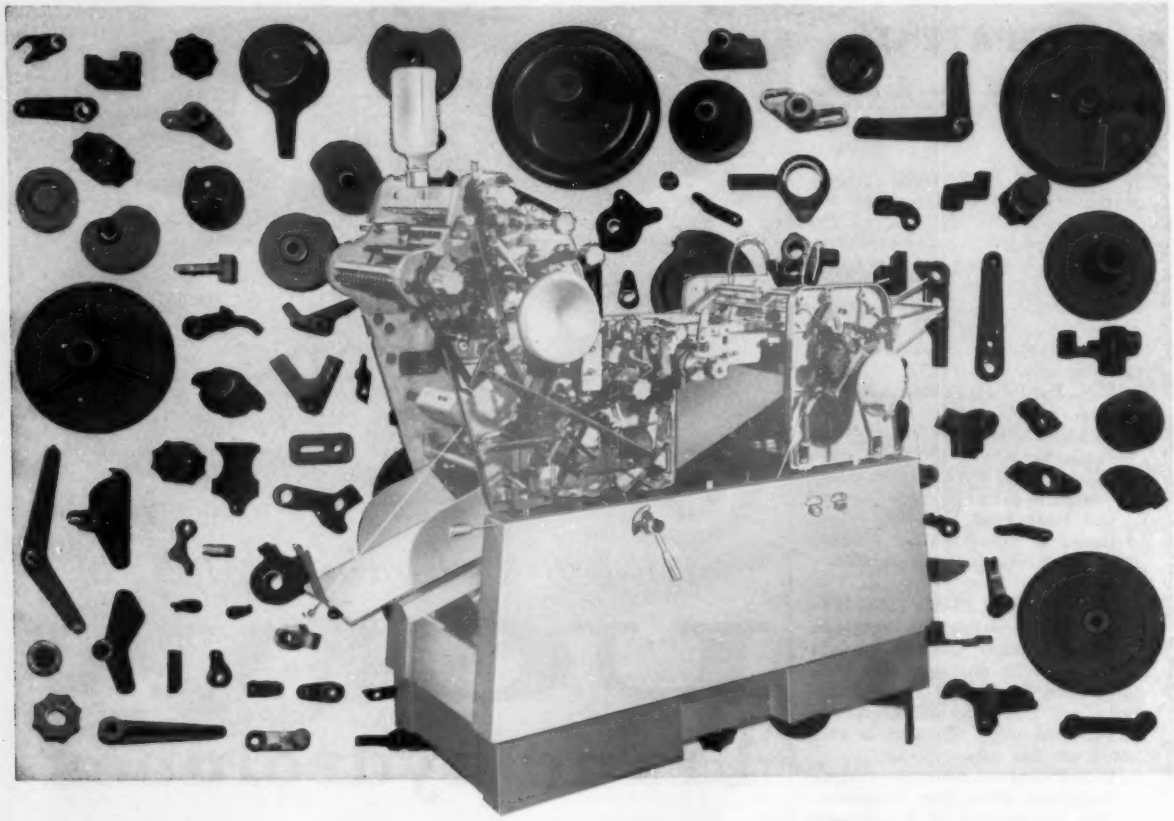

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OVER 125 SHELL-MOLDED PARTS

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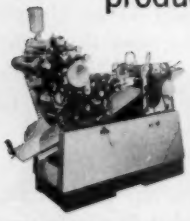

Whitin's *Masterlith* Duplicator* contains over 125 shell-molded parts! And here are the advantages that Whitin gets from selecting shell molding over other foundry techniques:

1. **Smoother finish** that drastically reduces machining, minimizes the need for expensive machining equipment.
2. **Closer tolerances** that enhance *Masterlith* Duplicator performance.
3. **Sounder internal structure** that cuts reject losses.
4. **Precise dimensional reproduction** of intricate shapes.

Whitin uses General Electric shell-molding resins *exclusively* in producing parts for the *Masterlith* Duplicator, relying on them for batch-to-batch uniformity and correctly balanced properties.

*Mfd. by Whitin Business Equipment Corporation, Whitinsville, Mass.

How can shell molding help YOU?

General Electric maintains a shell-molding laboratory in Pittsfield, Mass., to help foundrymen and casting buyers solve problems and evaluate the process. Ask us about it, or write today for a free copy of the *G-E Shell-Molding Manual* which describes and illustrates the techniques and benefits of this new casting method. *CHEMICAL AND METALLURGICAL DIVISION, General Electric Company, Section TM-1 Pittsfield, Massachusetts.*

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- **HANDY SHOT PLUNGER SPEED-ADJUSTING VALVE**

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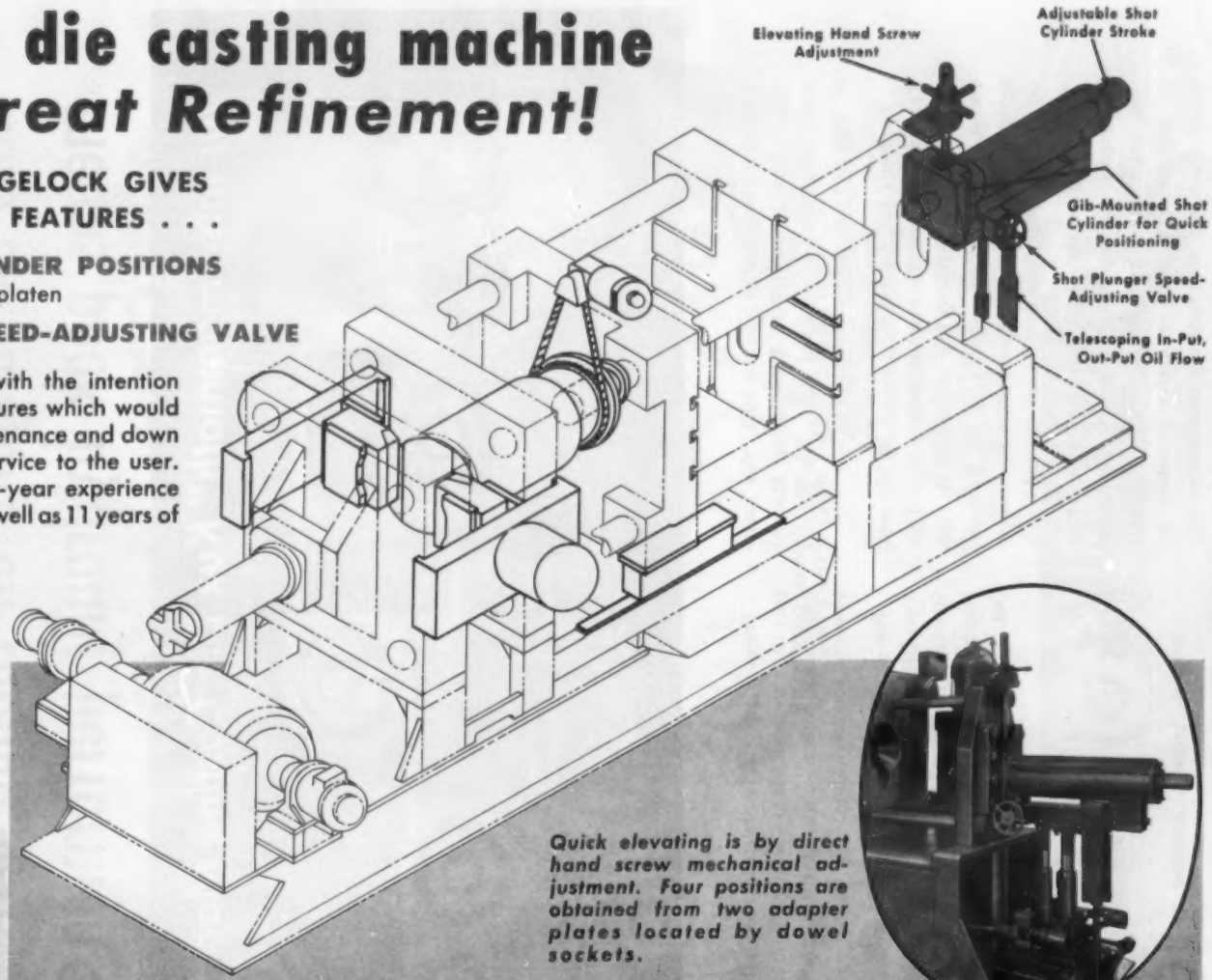
Elevating Hand Screw Adjustment
Adjustable Shot Cylinder Stroke
Gib-Mounted Shot Cylinder for Quick Positioning
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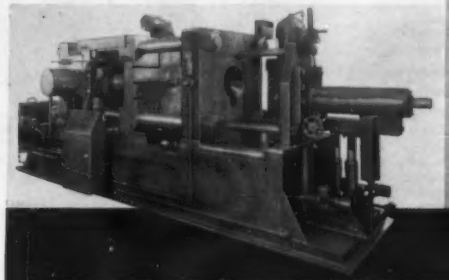
Telescoping In-Put, Out-Put Oil Flow

Quick elevating is by direct hand screw mechanical adjustment. Four positions are obtained from two adapter plates located by dowel sockets.



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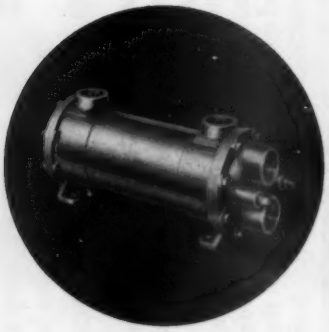
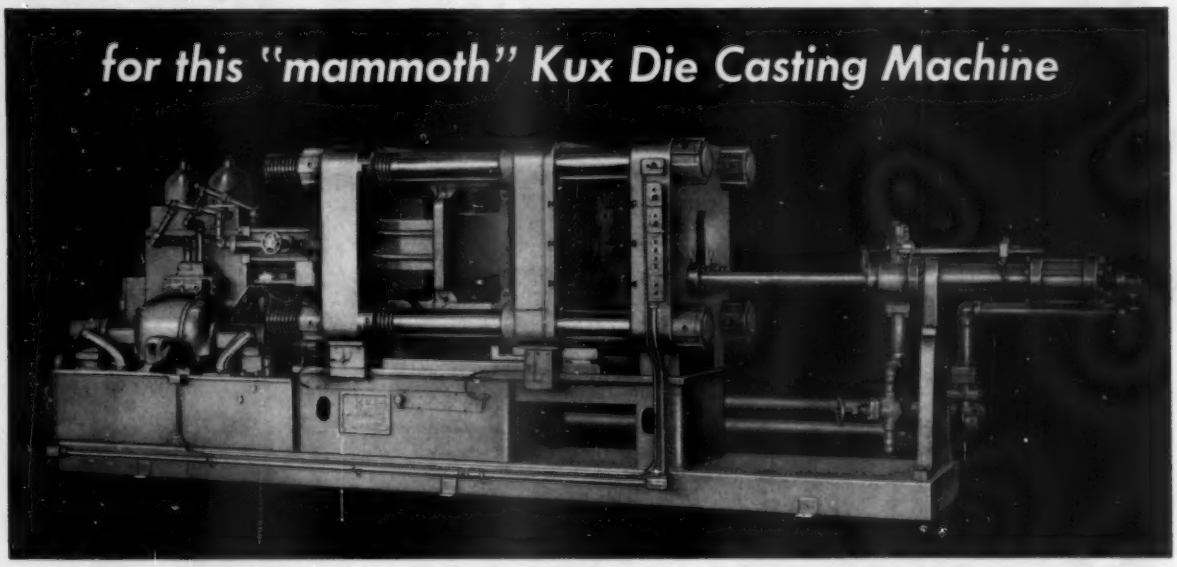


ROSS

Ross Exchanger's oil cooling efficiency means peak hydraulic performance

for this "mammoth" Kux Die Casting Machine



"One of the largest of its type ever built," this "mammoth" Kux Model HP-38 Die Casting Machine turns out aluminum, brass and magnesium castings of "immense size and tremendous weight."

To insure full die locking pressure of 750 tons, Kux has equipped this machine with a Ross Type BCF Exchanger providing safe, dependable oil cooling at all times. Peak capacity of the hydraulic power system is consistently maintained by eliminating pump slippage from over-heated, thinned oil.

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For detailed information, request Bulletin 1.1K5. Ross Heat Exchanger Division of American-Standard, Buffalo 5, N. Y. In Canada: American-Standard Products (Canada) Limited, Toronto 5, Ont.

ROSS HEAT EXCHANGER

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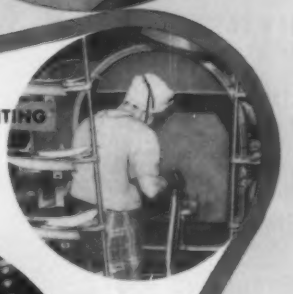
DIE CASTING NEWS



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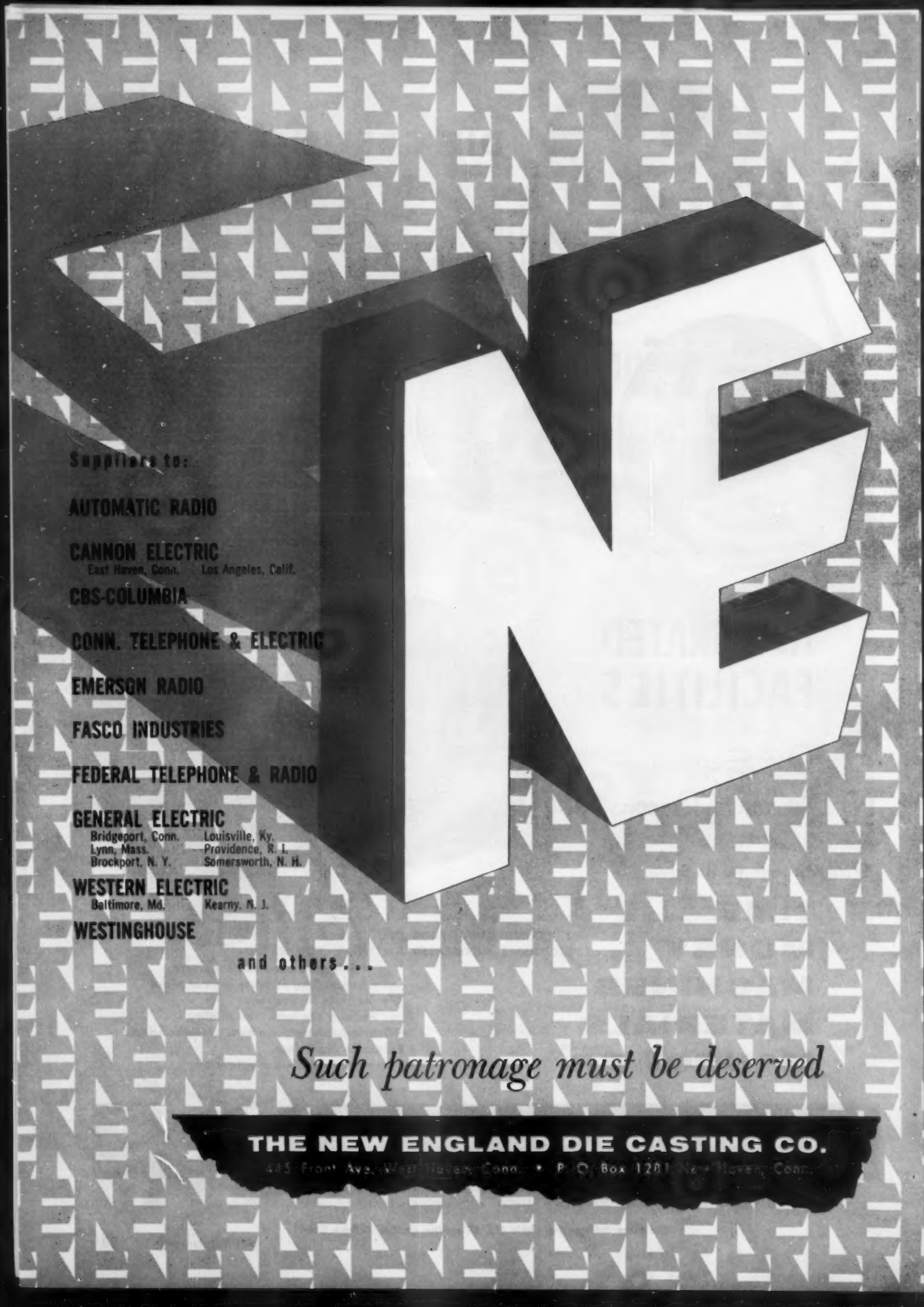
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Changes in choice of materials and methods of fabricating, as well as automation of machining operations have already resulted from this . . .

Cost Reduction Program For Dial Telephones

By JAMES KESSLER
Electro Mechanical Design Engineer
Stromberg-Carlson,
a Division of General Dynamics Corp.

A COST reduction program aimed at the manufacturing methods used in producing dial telephones is paying off at Stromberg-Carlson, Rochester, N. Y., electronic and telecommunication equipment manufacturer . . . a division of General Dynamics Corporation.

While the cost study is being continued in connection with other of Stromberg Carlson's products, a number of changes have already been put into effect. Two processes which figure importantly in redesign of components are powder metallurgy and die casting.

Among the early results of the program, several specific accomplishments can be pointed out:

1. A number of major components of the dial telephone, previously made from wrought brass stock, are now being produced from brass powder.
2. One component that had been turned from stainless steel bar stock is now pressed from nickel silver powder.
3. The telephone dial base, originally an aluminum die casting, has been converted to zinc alloy.
4. Completely automatic machining has been introduced to perform all secondary operations on the die cast dial base.
5. Tests are now being completed on first samples of zinc die castings which will replace stamped brass structural components.

Currently, a number of parts used in other equipment, such as the multi-line telephone, are being tooled for production by powder metallurgy. Other components are being studied and necessary changes made to permit fabrication by one of the low cost molding methods.

While directed primarily at cost cutting, the program has also brought about some refinements in design to gain functional advantages. In each case, a study of physical properties and performance preceded any change in material specifications to assure that the new material would be at least equal to the one it replaced.

Presented here are several typical examples of parts that have been converted from one manufacturing method to another to reduce costs.

HERE'S HOW POWDER METALLURGY AND DIE CASTING ARE SAVING DOLLARS FOR STROMBERG-CARLSON

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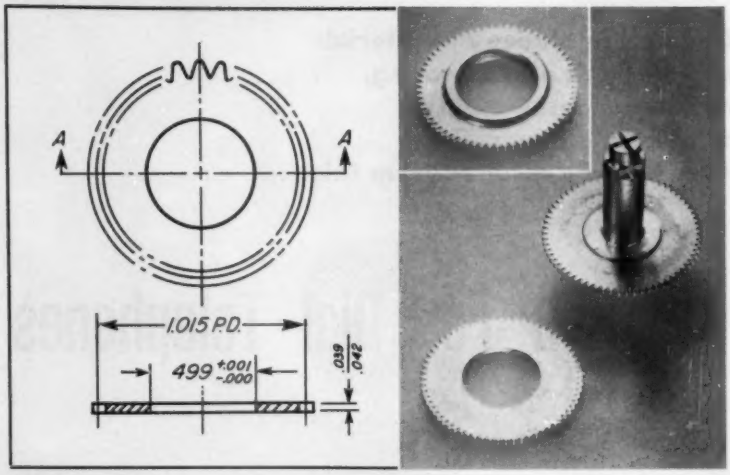
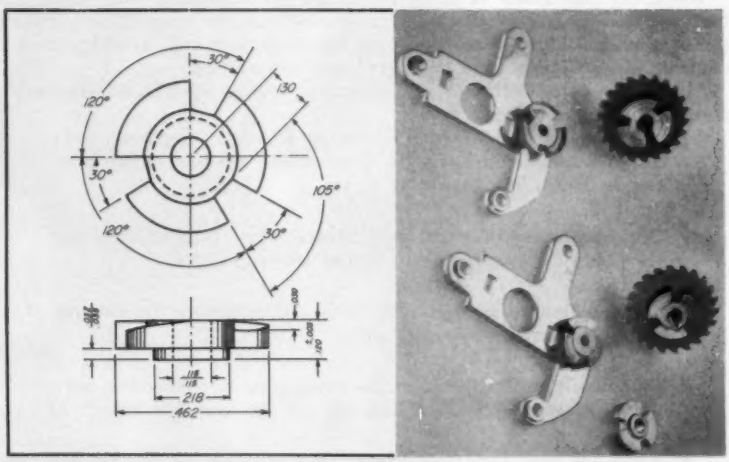


FLATNESS on this spur gear is held to .002 TIR by powder metallurgy. Photo shows gear and assembly; inset is gear made by screw machine and hobbing.

Spur Gear from Brass Powder Meets

In dial telephones, a very thin spur gear is a key performer in establishing smooth, quiet and dependable dialing. This gear was originally made by turning a blank on screw machine and then hobbing the teeth. A small, central hub was later eliminated from the gear so that it could be blanked from a sheet. The blanks were then stacked to permit hobbing teeth on many gears simultaneously.

Now, following a long period of development and engineering, the gears are being produced by powder metallurgy. Keystone Carbon Company presses them



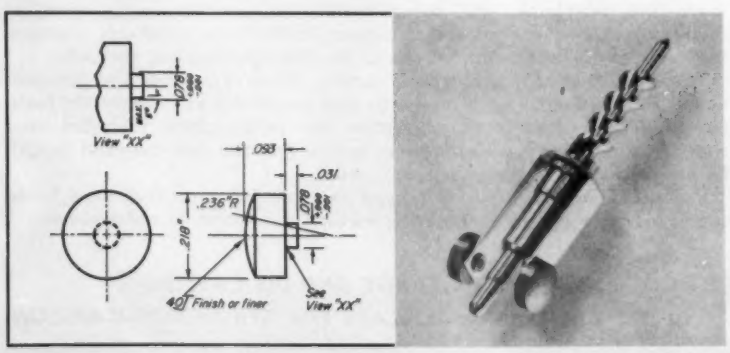
NINE CENTS are saved on each pair of powdered metal ratchets and bearings. Assemblies in foreground include powdered metal components.

Ratchet and Top Bearing Redesigned

Two elements in the dial clutch mechanism that have similar forms and have, consequently, followed a comparable process of redesign, are the ratchet and top bearing. Each of these was previously turned on a screw machine and finished by milling three radial slots to act as detents for a light spring pawl.

Now these components are pressed from brass powder by Merriman Brothers, Inc., gaining a substantial cost reduction and also some design improvements.

The three slots in the ratchet control the pulsing of the dial, and are held to tolerance of



NICKEL SILVER in place of machined stainless steel saved some difficult machining operations on these tiny governor weights.

Governor Weights in Nickel Silver Save

In Stromberg-Carlson's dial telephone, the speed of the dial in returning to normal position is controlled by a small governor. As the governor spins, a pair of small weights is thrown outward by centrifugal force against the inside of a drum, retarding the speed of the dial.

The governor weights were previously machined from stainless steel bar (AISI 430-F) but machining this material to get the accuracy and surface finish

Close Tolerance Limits

from brass powder, sinters and coins. Composition of the powder is: 78.5% Cu, 1.5% Pb, 20% Zn.

Critical tolerances are .039/.042 on thickness, .002 TIR on flatness, and .499 + .001—.000 on center hole. A special setup with optical comparator has been installed by the vendor to inspect these components.

How much is saved by the conversion? When the design was changed from a screw machine part to a hobbed "washer", cost was cut by 30 percent. Now, with powder metallurgy, cost of the spur gears is down 75 percent from the original type of gear.

From Screw Machine Fabrication

± .002. Tolerance on the thickness is held to ± .003. Density is held between 7.5 - 7.8 g/cc.

The three segments of the ratchet and top bearing have been designed with cammed surfaces now to help guide the pawl more easily and smoothly into the detent slots. A very critical formed spring pawl has been replaced by a simpler straight spring now, and tension is lighter, due to the introduction of the three cams.

Both the bearing and the ratchet are assembled by a simple swaging of the shank of the powdered metal parts.

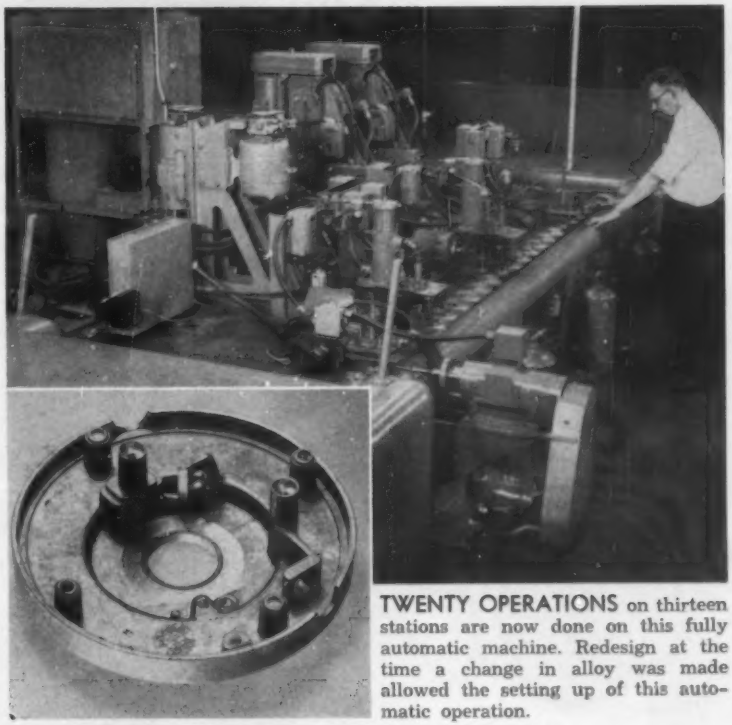
Savings on each pair of bearings and ratchets is nine cents.

Difficult Machining

needed was difficult. The weights are now made from nickel silver powder by Merriman Brothers, Inc. Powder composition conforms to 64% Cu, 18% Zn and 18% Ni (New Jersey Zinc #1601).

Weight and surface finish are critical, with weight held to .3980 ± .0450 grams and surface finish to 40 microinches. Parts are supplied with minimum density of 7.8 g/cc.

Continued on page 100



TWENTY OPERATIONS on thirteen stations are now done on this fully automatic machine. Redesign at the time a change in alloy was made allowed the setting up of this automatic operation.

Dial Base

Athough the telephone dial base has conventionally been produced as a die casting because of the complexity of shape and accuracy of dimension that must be combined, a change in alloy and in machining setup have been introduced to cut costs.

The alloy change is from aluminum to zinc, and is accompanied by several design changes in the component not directly related to the die casting process. Machining has been simplified and ganged into a single, completely automatic machine. Following are the 20 operations now performed in sequence at 13 stations:

Station 1 — Drills vertically two #43 holes, for #4-36 threads.
Drills vertically one #46 hole, for #3-48 threads.
Drills horizontally .159" hole and .199" hole, in line, by 2-step drill.

Station 2 — Drills vertically two #46 holes, for #3-48 threads.
Drills vertically one #43 hole, for #4-36 threads.
Counterbores, .203" by .031" deep.

Station 3 — Reams .702", and faces 1-5/64ths counterbore.

Station 4 — Counterbores .200" and faces top of two posts to .795" dimension.
Reams .171" hole.
From below, mills .015" off-center stop lug.

Station 5 — Faces bearing seat on .702" hole, from below.
Burrs two holes.

Station 6 — Burrs two holes.

Station 7 — Probes all drilled holes.

Station 8 — Taps three #3-48 holes.

Station 9 — Taps three #4-36 holes.

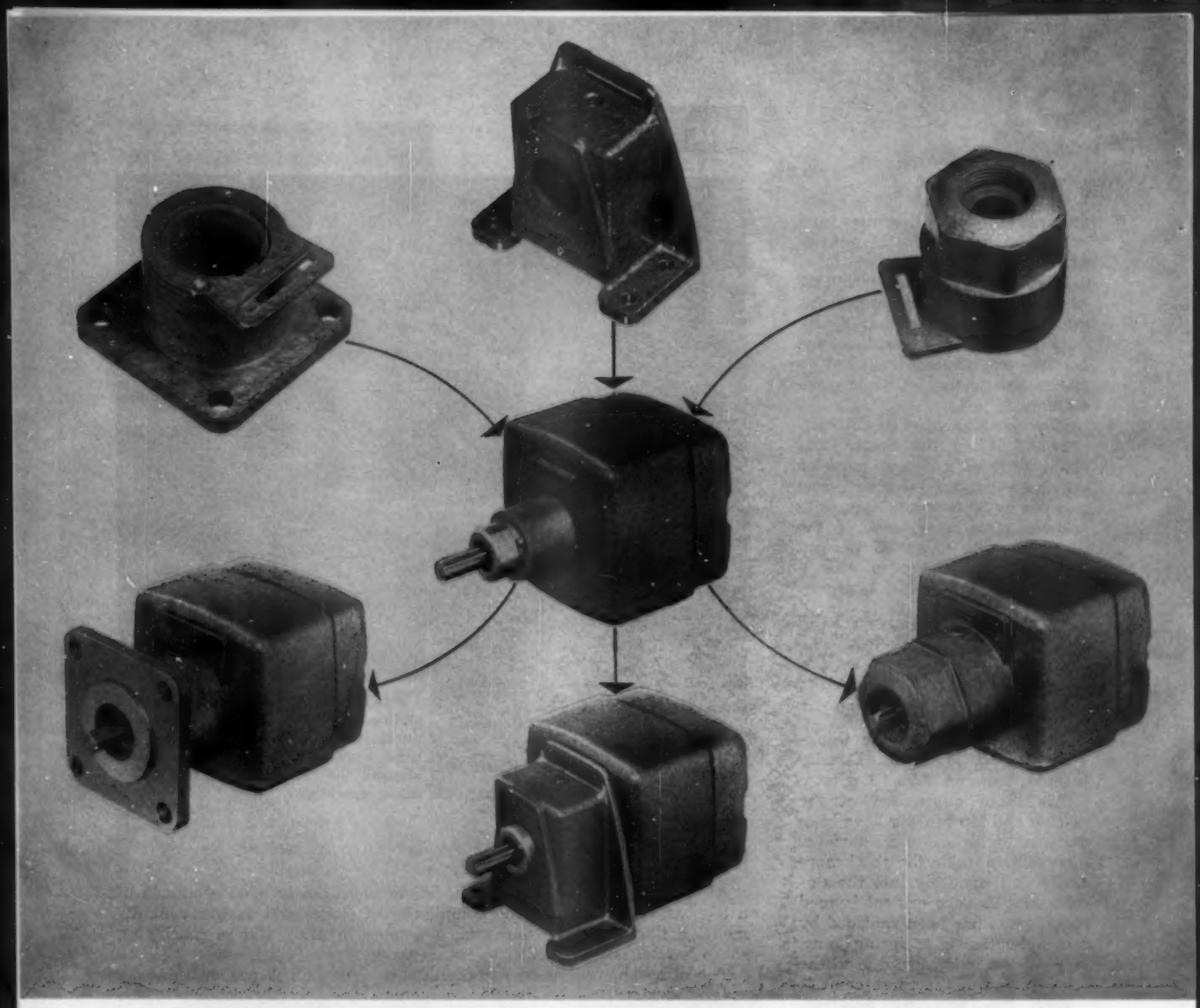
Station 10 — Taps #10-32 hole, horizontally.

Station 11 — Mills face of #10-32 hole.

Station 12 — Mills inside face of .199" hole.

Station 13 — Mills two bayonet slots .060" wide by .025" deep on .850 radius, below.

Stations 1 and 2, 3 and 4, 5 and 6, 8 and 9 are paired in dual heads.



ONE INSTRUMENT plus several low cost, die cast mountings equals high instrument mounting flexibility.

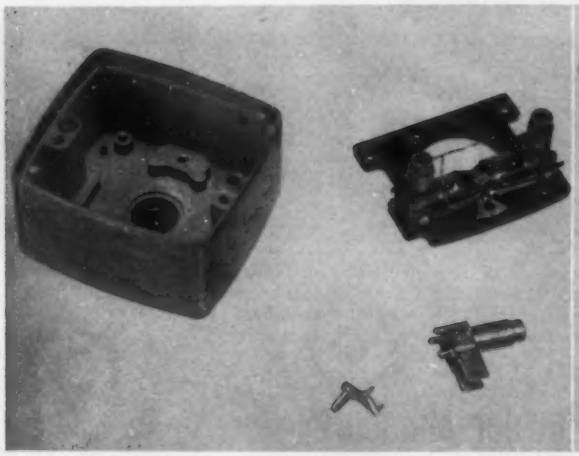
Simplified positioning and locking for

Flexibility In Mounting Instruments

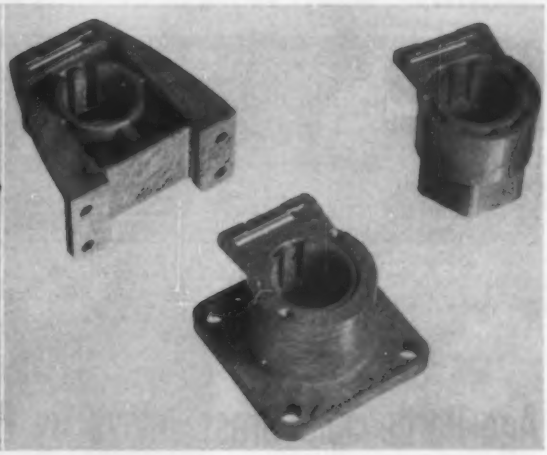
By K. F. CARLSTEN, Chief Engineer
Metron Instrument Company

DESIGNING for die casting gives to the engineer a degree of latitude that is not possible in any other method of fabrication. Not only is it possible to achieve a physical configuration that cannot be economically secured in any other manner, but the wide range of physical and mechanical properties available in die castable alloys makes it possible to choose those characteristics best suited for the particular part or application. This is true provided the piece being considered can be of a non-ferrous alloy.

In the case of the tachometers made by Metron Instrument Co., zinc die castings are used. The ductility of the metal, its adequate elastic properties, the sufficiently good electrical conductivity, the ease with which it can be cast to finished shape and dimensions,



2. SELF CONTAINED positioning and fastening devices make assembly rapid and low cost.



3. FLEXIBILITY OF ZINC is sufficient to give an adequate locking method without damage.

and the excellent surface in the as-cast condition all contributed to the choice. This instrument, with several different mounting brackets, is shown in Figure 1.

Considering first the tachometer housing, an internal view of this case is shown in Figure 2. As would be expected, all of the positioning and locating bosses for mounting the tachometer are cast in. However, to insulate the instrument electrically from the case, a Micarta plate must be positioned in it. This plate with a part of the assembly on it is also shown in Figure 2. In order to position this plate properly two pins are formed in the case casting, one of these is indicated at point "a". When the Micarta plate with the necessary parts fastened to it is assembled, these zinc base pins fit into holes in the plate and three machine screws serve to fasten the plate into the case.

At position "b", Figure 2, another of two cast pins is shown. These pins serve to locate and hold a second Micarta plate, in this case a terminal and cover plate, in place. Since this second plate may have to be removed from time to time, two Speednuts are used. These spring fasteners dig into the relatively soft metal and hold the terminal plate firmly in place.

Mention was made earlier that the electrical properties of the die cast parts are used. On the mounting plate, shown in Figure 2, three die cast terminals can be seen and, beside the plate, two of the die cast terminal posts. On both of these posts, zinc pins have been cast which pass through holes in the Micarta. In addition, two positioning lugs are cast on the larger terminal (one on each side) that serve to locate the small switch parts. The small holes in these terminals are drilled. The difference in the pins on these posts should be noted. In the case of the large terminal where riveting is to be done, a recess is cast into the rivets so that they can be spread easily for fastening. On the small part, however, the posts are for locating only and fastening is done with a machine screw. Since spreading is undesirable here, the posts are tapered to a point to aid in entry into the holes in the Micarta plate.

Referring back now to Figure 1, on the tachometer housing, a cast shank is provided. This shank serves a dual purpose of providing a long housing for the miniature ball bearings used to mount the rotor and also as a mounting member which fits the different brackets shown. This shank must be bored to accept the ball bearing, but the OD is cast sufficiently to size so that no machining at all needs to be done.

Just above the shank, a small boss can be seen. On this boss the serial number of the instrument is stamped, while above it is the word "Type" and to the left the number "30", both of which are cast on the case. This number refers only to the unmounted tachometer and must change with each different assembly.

Now, consider the mounting brackets shown in Figure 3. The first thing to note is that each bracket is cast with a slot that precisely fits the cast boss on the case. This serves to properly locate each bracket with respect to the tachometer and also to prevent turning. But, as noted above, the type number changes with each different bracket. Small recesses are, therefore, cast on the back side of the flange. Thus, when the bracket is applied to the instrument, the boss fits into the slot and the word "type" and the number "30" are both covered by the flange. Then, on the flange, the word type is again cast as is the proper number. This sort of construction is easily done by die casting, but would be impossibly expensive if done in any other manner.

With the construction described, the instrument and the most desirable type of mounting can be fastened together in precise and permanent alignment. But, thus far, no provision has been made to prevent pulling the two apart. A set screw is visible in the collar of the brackets. Adequate locking can, of course, be secured by simply tightening the screw so that the tip digs into the housing shank slightly. Obviously, this marring of the casting is undesirable and, if attachment and removal is at all frequent, will result in inaccurate positioning.

Continued on page 101

PMM TECHNICAL REFERENCE FILE

Useful data on age-hardenable brass alloys through powder metallurgy are available from The New Jersey Zinc Co. (of Pa.) A comparison of the composition and properties of some typical alloys in relation to hardness and strength is presented and the effect of coining on these alloys is shown.

Age-Hardenable Brass Alloys By Powder Metallurgy

1. COMPARISON OF WROUGHT & POWDER METALLURGY BRASS PARTS

The amount of hardening and strengthening that can be produced in powder metal parts by coining or repressing is small compared to that obtained with cold drawn rod. For comparison, the maximum values of sintered, leaded 80-20 brass powder are shown below with the properties of two wrought brass rod compositions.

Material	Form	Tensile Strength, psi	Elongation, %	Brinell
89 Cu-9.25 Zn-1.75 Pb	Annealed Rod	37,000	45	50
89 Cu-9.25 Zn-1.75 Pb	½ Hard Rod	52,000	18	100
61.5 Cu-35.5 Zn-3 Pb	Annealed Rod	49,000	53	65
61.5 Cu-35.5 Zn-3 Pb	½ Hard Rod	55,000	32	120
80-20 Leaded Brass	As Sintered	30,500	20	43
80-20 Leaded Brass	Coined-50 tsi	39,700	6	73

2. NICKEL PHOSPHIDE AND IRON-NICKEL PHOSPHIDE HARDENED ALLOYS

Although nickel phosphide is an effective age hardening ingredient, higher nickel alloys have unsatisfactory sintering qualities. Due to the cost of nickel, the most suitable alloy in this range is L1250. Addition of iron will eliminate the low melting phase but degrades the hardness values attained during sintering. Alloy L1260 with higher concentration of nickel and phosphorous, plus iron, has the best combination of properties and cost. Comparative compositions and properties of L1250, L1260, and 1163 (80-20 leaded brass) are given below.

COMPOSITION — PERCENT				PROPERTIES (1)			
	1163	L1250	L1260		1163	L1250	L1260
Copper	78.5	76.3-79.3	77-80	Tensile Strength, psi	30,500	43,000-48,000	40,000-45,000
Zinc	20	Remainder	Remainder	Elongation, %	20	26-32	16-23
Nickel	None	1.2-1.7	2.1-2.6	Brinell	43	63-70	70-80
Lead	1.5	1.1-1.7	1.1-1.7	Sint. Density, g/cc	7.9	7.80-8.00	7.80-7.95
Phosphorus	None	1.3-1.8	1.4-1.9	Shrinkage, %	1.2	2.65	2.3
Iron	None	None	.25-.50				

(1) Compacted at 35 tsi (1163) and 30 tsi (L1250) & (L1260); 0.75 zinc stearate (1163) and 0.5 (L1250) & (L1260); sintered at 1600 F (1163), 1475 F (L1250), and 1525 F (L1260).

3. EFFECT OF COINING ON BRASS POWDER ALLOYS

Both L1250 and L1260 develop rough surfaces and gray-yellow color during sintering. However, coining rectifies the roughness and during the coining procedure substantial hardening through deformation is noted. Typical data on these effects are compiled below.

ALLOY (1)	TENSILE STRENGTH, psi		ELONGATION, %		BRINELL HARDNESS		DENSITY, g/cc	
	Sint.	Coined	Sint.	Coined	Sint.	Coined	Sint.	Coined
1163 (2)	30,500	28,300	20	9	43	52	7.94	8.13
L1250	44,800	46,700	31	18	69	86	8.14	8.15
L1260	41,000	44,100	16	11	74	89	8.0	8.08

(1) 0.5% zinc stearate in L1250 and L1260, 0.75 in 1163; initial pressing at 25 tsi (L1250), (L1260) and 35 tsi (1163).
(2) Leaded 80-20 brass — from series set forth in Table I.

'dag' dispersions... *a touch does so much!*

Outer housing and other pieces of the die are dipped into **'Aquadag'**.

Outer housing of die with finished casting ready for removal. Press will force casting from mold.

Castings after removal from mold.

'Aquadag' Succeeds Where Others Fail...

Reports Diehl Manufacturing Company

When molten aluminum at 1300-1400 degrees F. is poured into a centrifugal mold spinning at high speed, an exceptionally durable parting compound must be used. **'Aquadag'** has been satisfying this need for 14 years in a centrifugal casting operation at Diehl Manufacturing Company, Electrical Division of the Singer Manufacturing Company, world-renowned makers of Singer Sewing Machines. Other products have been tried, but without success.

Diehl reports that **'Aquadag'** pays off in three ways:

By speeding production
By increasing mold life
By producing better castings

'Aquadag' protects the mold against the impact of high-velocity molten aluminum. It prevents aluminum from adhering to the die, and protects the purity of the castings by preventing iron transfer from the mold to the aluminum melt. One application of **'Aquadag'** lasts for at least six castings, which are produced at the rate of about one per minute per machine.

Write for Acheson Bulletin 425 on Metal Casting Operations for practical information on product improvement and lower costs in your own shop. The Acheson Service Engineer in your area will be glad to consult with you.

For ready-to-use materials containing 'dag' dispersions see your own oil supplier, or write directly to us.

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PORT HURON, MICHIGAN

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Mica and other solids

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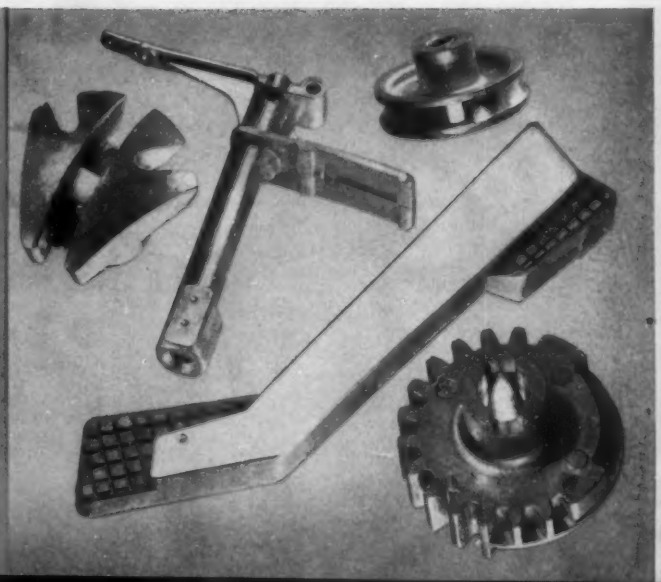
For economical production...

Machining Costs

A MECHANISM with a memory best describes this automatic record selector and player.

LONG SERVICE LIFE is the principal consideration in choosing the materials, and cost of manufacturing determines the method of fabrication for all parts that are used in these "juke boxes." These two factors have influenced the specification of both zinc and aluminum die castings for many parts. Less than half of the die castings used are shown here. While many are original die casting design, some represent a change from a different manufacturing method where a clear dollar saving could be realized without sacrificing quality.



Are Balanced Against Casting Costs

THE new AMI Multi-Horn High Fidelity "juke box", spotted in a good location, may operate almost continuously from 12 to 16 hours per day. This high usage imposes a need for precision engineering, careful selection of materials and close adherence to specifications in manufacture to avoid excessive wear.

However, if the instrument is to show a fair return on the initial investment, the first cost and the maintenance costs must be kept low. Experience over many years of manufacturing showed AMI Incorporated that both zinc and aluminum die castings fulfilled all requirements for many of the functional parts. Further, through the use of die castings, the amount of machining and assembly of components was materially reduced. The net result has been a marked decrease in manufacturing costs.

When a decision is reached to use die castings for any parts, attention must be given to how complete the castings are to be made by the foundry. Many refinements in casting are possible if the cost of saving one or more machining operations is substantial. On the other hand, it is often much sounder to make a simpler or a less accurate casting and do some machining afterwards. Only close co-operation between the foundry and the consumer can determine this factor.

As an example, it is generally cheaper to ream a hole to size than to try and cast it sufficiently accurate, particularly a long hole with appreciable taper. Also, on small holes, say about 0.050 in. diameter or less, core pin breakage is likely to be excessive; drilling these holes is, therefore, usually cheaper.

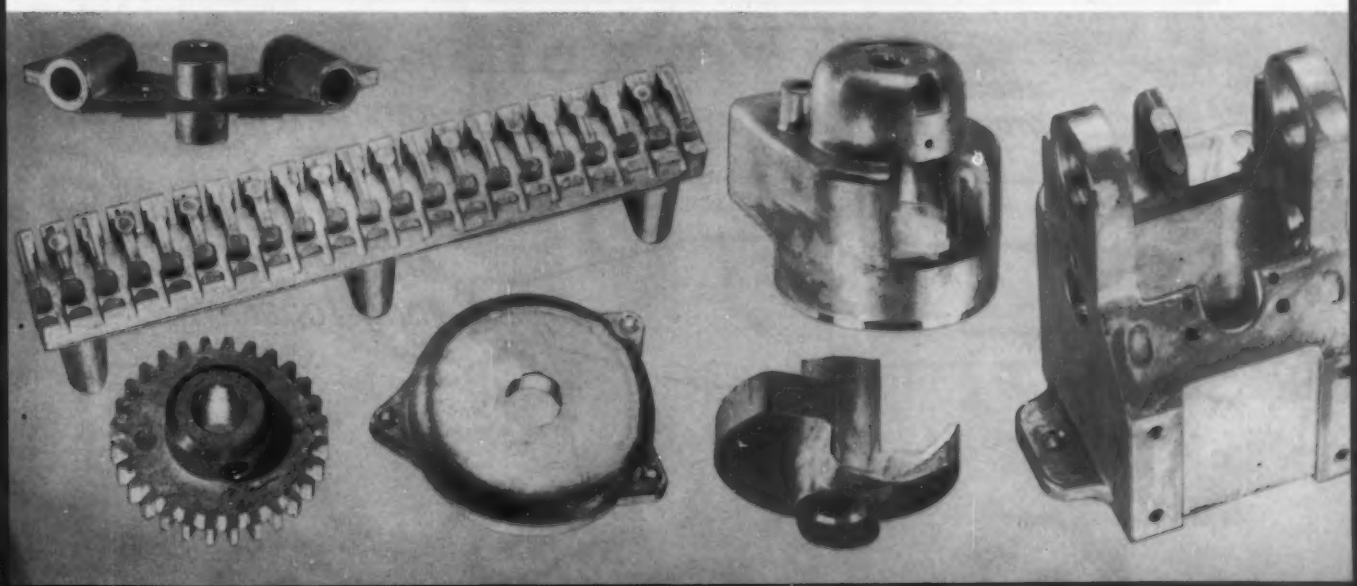
Most die castings are made with sufficient accuracy so that one or more faces can be used for location when machine work is to be done. This materially lowers the cost of jigs and fixtures.

In the accompanying illustrations, some of the die castings used in the record changer, turn table and pick-up are shown.

Except for the tone arm, which is cast in aluminum, all of the castings are zinc. In the case of the tone arm, weight is, of course, of primary importance. Special note should be taken of the extremely thin wall that has been cast on this part. The under side is shown to illustrate the method of ribbing used to give the needed rigidity without increasing the weight appreciably.

All castings shown are made by Nelson Metal Products Co., American Die Casting Co. or Grand Rapids Die Casting Co. Except for normal flash removal and trimming, all machine work on the castings is done within the AMI plant.

Mention was made above that most of the castings are original die casting designs. The tone arm and the pivot and rest are the two exceptions. The tone arm was originally an assembly of a stamping and a permanent mold casting. There was no saving in cost made by changing to a die casting, but a functionally superior part was achieved. On the pivot and rest, the original design was three stampings and two screw machine parts. Not only has die casting given a better piece, but also a saving of over 19 per cent.

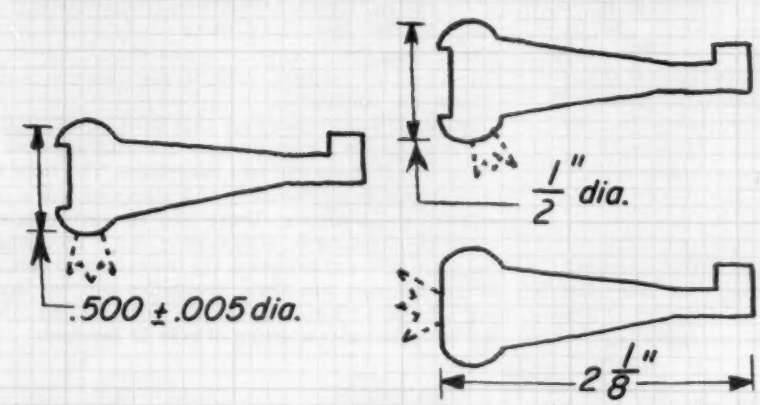


Design Pointers
FOR INVESTMENT CASTINGS

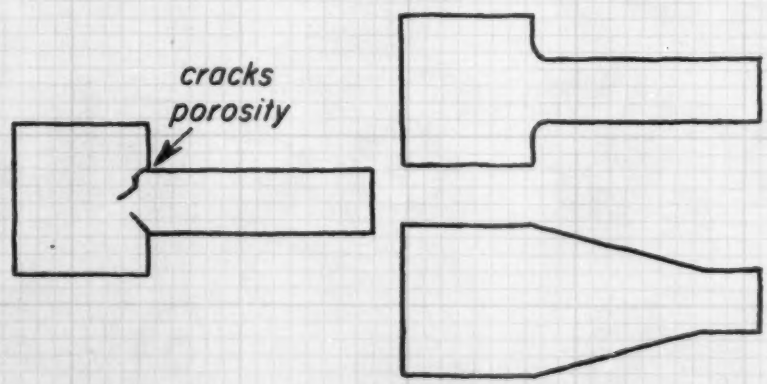
MONEY SAVERS

HERE are some practical suggestions to help you with your designs for investment castings. They can save you money, improve your product, speed up production, or help you and your investment caster to understand each other more easily. Close cooperation with your foundryman will give the best design for optimum performance and production.

UNDESIRABLE | DESIRABLE



Gates should be located away from critical dimension areas and when possible on flat, easily machined surfaces.

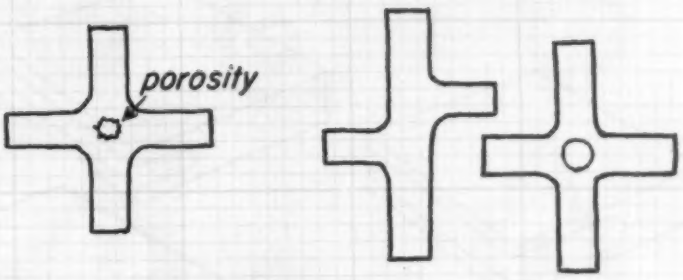


Cracking or porosity may develop at sharp corners.

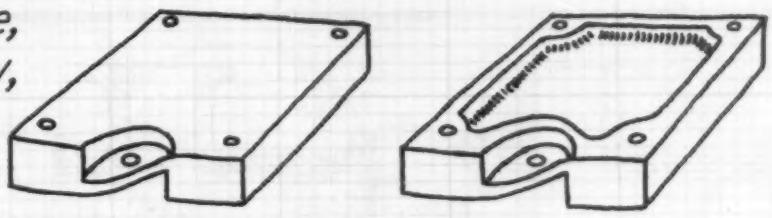
Use a generous fillet or, when possible, a long taper.

UNDESIRABLE | DESIRABLE

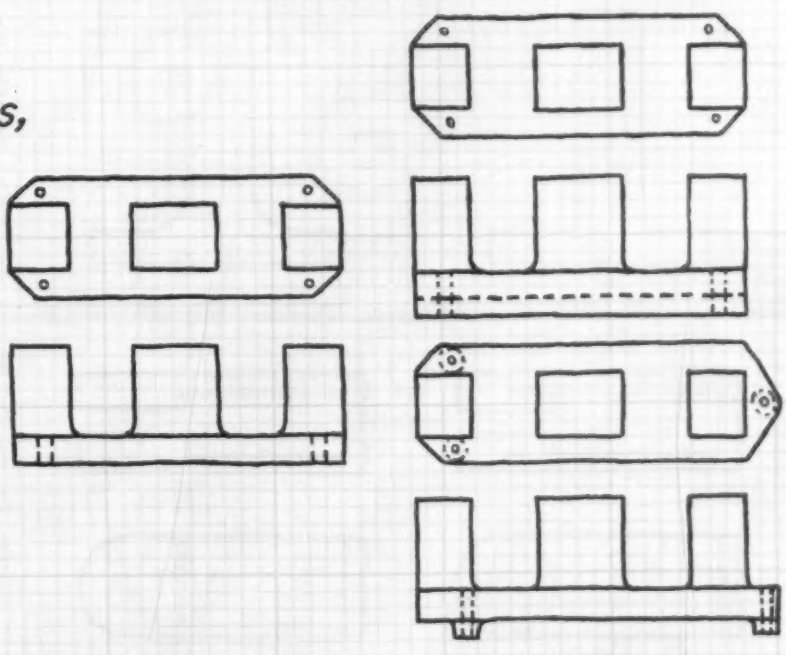
A heavy section adjacent to thin sections can cause porosity. Reduce the heavy section by an alternate design or by coring.



Relieving large flat areas, when possible, improves castability, saves metal and reduces weight.

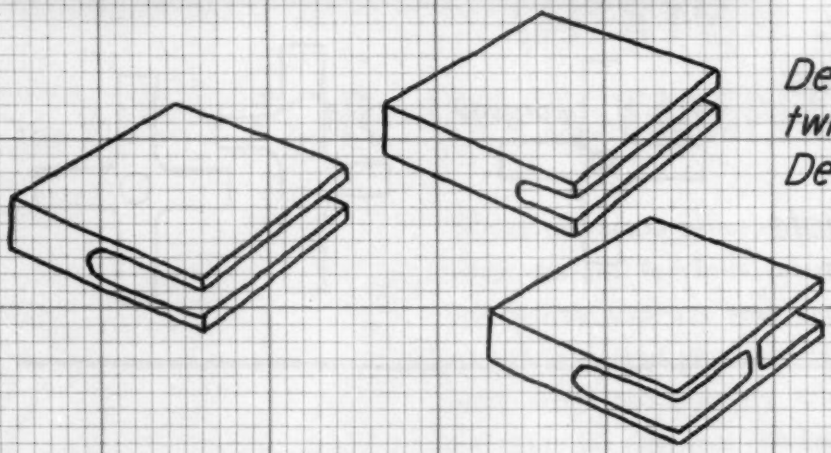


On large flat surfaces, machining stock should be left. Locating pads may be added without danger of warpage or distortion of the part in fastening.

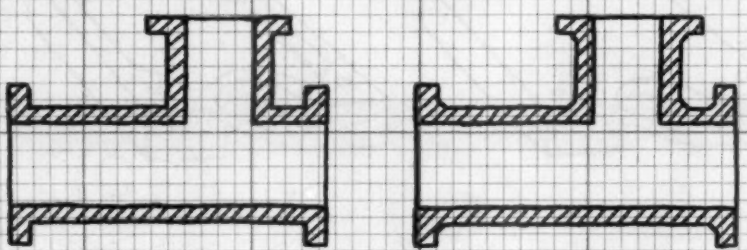


UNDESIRABLE

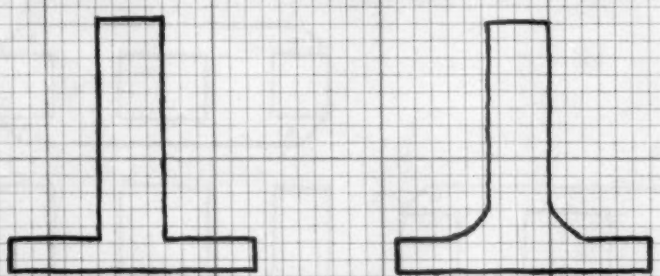
DESIRABLE



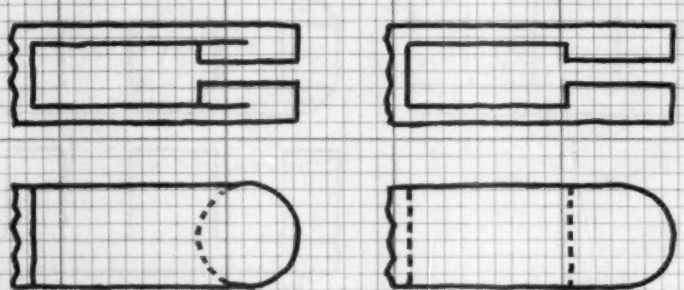
Deep slots result in twisting and warping. Decrease the depth of the slot or add a rib for stronger more accurate castings.



Use fillets and radii on internal and external corners. Keep section thickness uniform



Sharp corners and sudden changes of section can cause cracks and porosity.

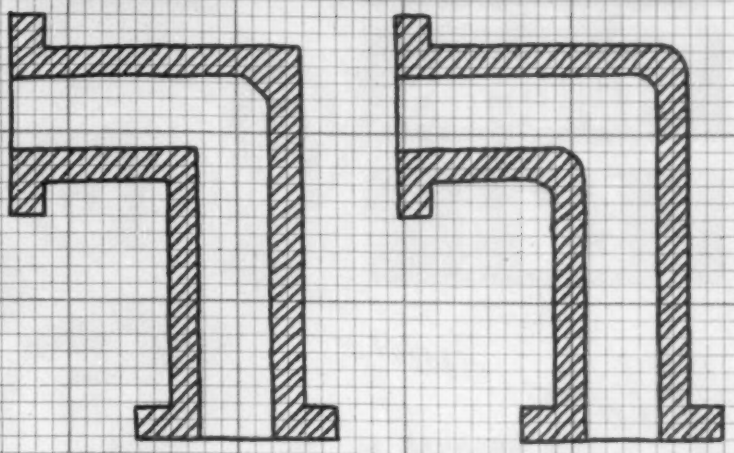


Avoid the necessity of split cores. Here by making the interior of the boss straight, a solid core can be used.

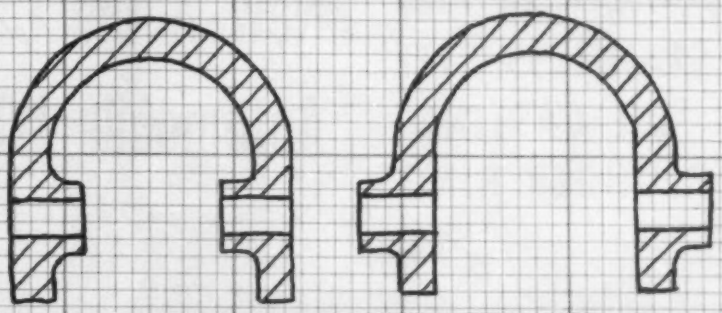
UNDESIRABLE

DESIRABLE

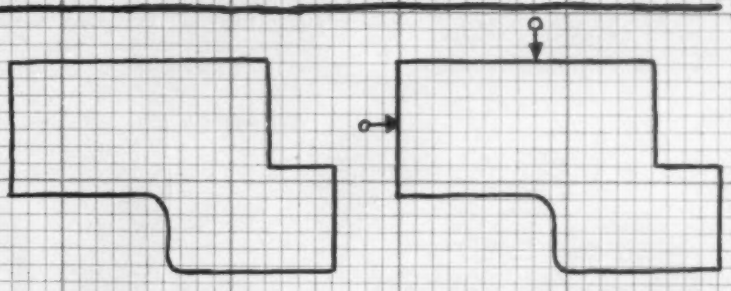
Avoid sudden changes in direction of metal flow. A sharp corner induces turbulence and mold washing with resulting inclusions and porosity.



Keep bosses on the outside of the casting to avoid the use of multi-piece collapsible cores.

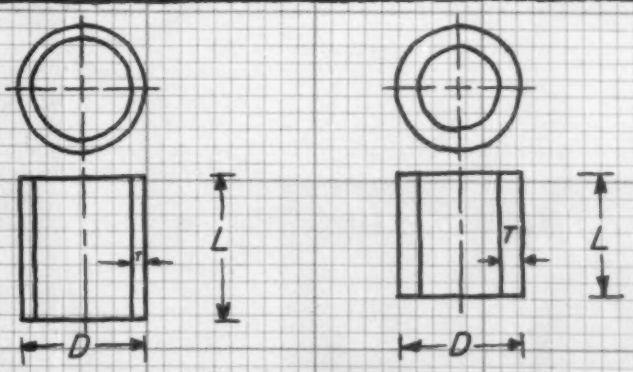


Indicate locating surfaces for subsequent machining so that the foundry will not gate a casting on a reference surface.



⊶ *Denotes locating surface*

On cylinders and other geometric shapes, hold wall thickness to $\frac{1}{3} - \frac{1}{4}$ *D. Length should be equal to or less than O.D.*



THANKS are due to: Arwood Precision Casting Corp., Delcro Stellite, Engineered Precision Casting Co., Hitchiner Mfg. Co., Midwest Foundry Co., and Westinghouse Electric Corp.

More next month

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Precision has developed, and is now testing experimentally, rings for use on cold chamber machine plungers. This new design will be released soon. The advantages will be tremendous. Perhaps you would like to have more information when these rings are released. We shall be pleased to hear from you now.

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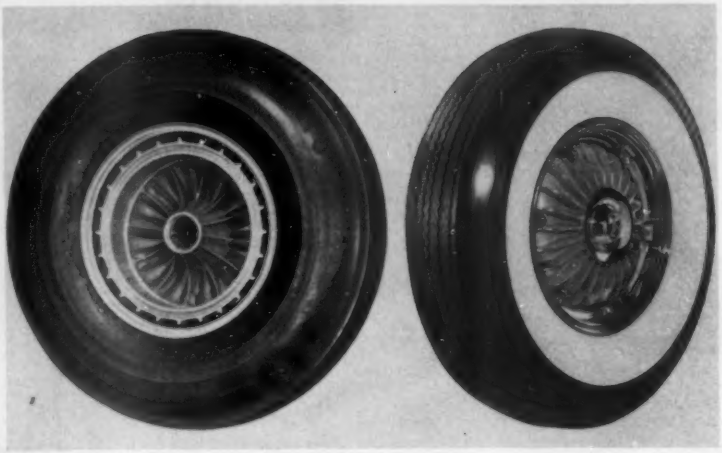

New-A Die Cast Aluminum Automobile Wheel

AN aluminum wheel, developed by Kaiser Aluminum & Chemical Corporation, to be die cast as an integral unit including hub and brake drum, offering the advantages of improved brake performance, greater strength and lighter weight, is being shown publicly for the first time.

The wheel is being exhibited by the company at the annual meeting of the Society of Automotive Engineers which opened January 14 in Detroit.

Design of the die cast wheel eliminates separate wheel disc and hub casting. These parts are combined with the brake drum to form a strong but lightweight and efficient structure. The rim is the demountable type, held in place with chrome rim clamps.

The prototype wheel, complete with 14-inch diameter steel rim, weighs only 30 pounds as compared with 42.6 pounds for a steel assembly, a weight saving of 12.6 pounds or approximately 30 per cent. This weight saving helps to improve overall car performance and comfort by providing reduced unsprung weight and better acceleration.

Mechanical tests indicate the aluminum wheel far surpasses the accepted standard for steel wheels in both brake performance and durability. The tests show substantially less brake fade. This can be attributed to aluminum's ability to dissipate heat rapidly and to design features which provide a more direct heat-flow path to the cooling area. Also, radial ribs on the surface of the wheel establish direct air flow over the periphery of the drum in addition to providing rigidity.

Heat transfer to the rim is minimized by reducing contact between the rim and wheel. As a result little direct heat is transferred to the tire,

The braking surface of the wheel can be either a metallurgically bonded iron liner, a cast-in iron liner, or a metallurgically bonded metal spray liner.

Aluminum's unique combination of properties permits wheel design features, such as these, not practical with other materials.

In manufacturing, the die cast method makes mass production of the wheel economically practical and permits many attractive styling variations.

Kaiser Aluminum's prototype wheel was developed by the company's product development department and is the result of 2½ years of design and research.

To keep pace with high speed production methods, as much hand work as possible must be eliminated. Bulk finishing in barrels virtually eliminates all hand operations except charging and discharging. How barrel finishing works, how it saves and a group of typical case studies begins on page 52.

PMM

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The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.

In this issue

51 Porosity detection in plated coatings

52 This is barrel finishing

60 A new pre-paint treatment for aluminum

Another **H-VW-M** *first!*

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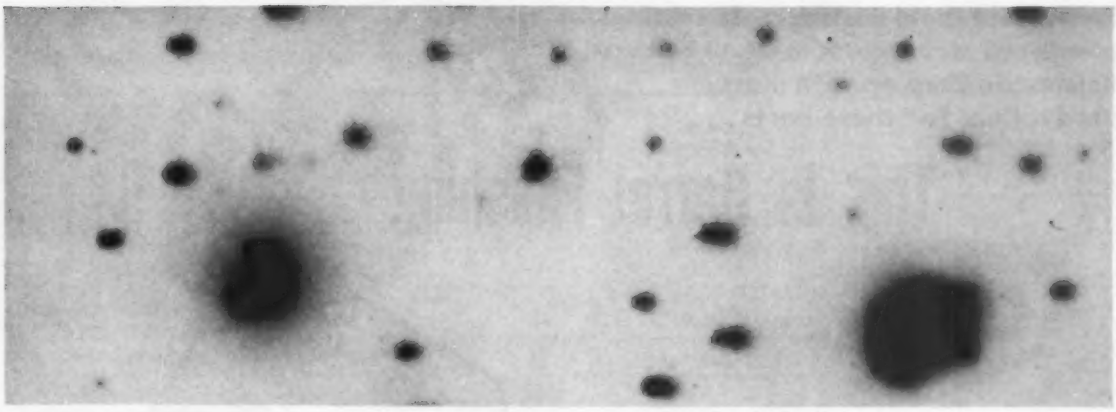
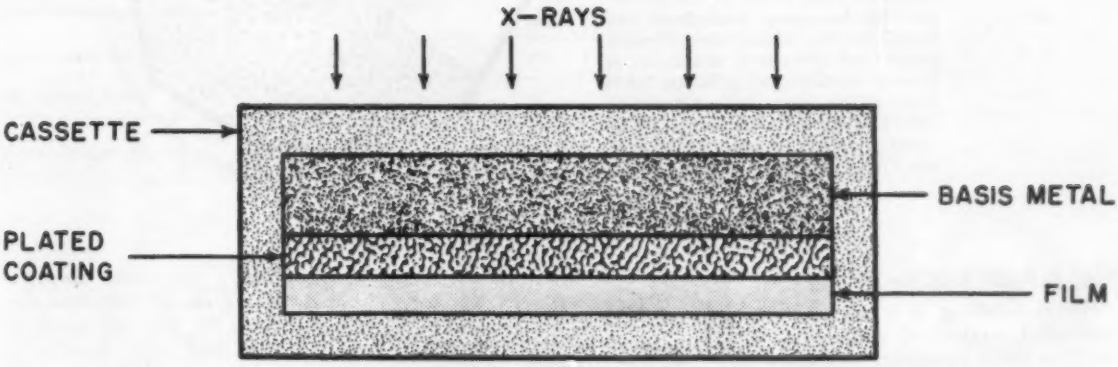


THIS x-ray photo from . . .



FROM this simple set-up enables . . .

Porosity Detection In Plated Coatings

PORES and other flaws seriously impair the quality of industrially produced electroplated coatings, diminishing the effectiveness as protective coating for metals. Until now it has been difficult to estimate the relative merits of electrodeposits since no method of determining the gravity of defects was available. Recently, however, the National Bureau of Standards has developed a nondestructive procedure for ascertaining both the size and position of pores.[1] The method involves photographing an electroplated specimen exposed to radiation.

In earlier research, a technique applicable to plated coatings that have been removed from the basis metal was developed by the Bureau.[2] However, the likelihood of stripped-coating porosity differing from adherent-coating porosity led to further investigation of the problem. The present work was carried out for the American Electroplaters' Society by F. Ogburn of the Bureau staff and Margaret Hilkert of the Society's research fellowship at the Bureau.

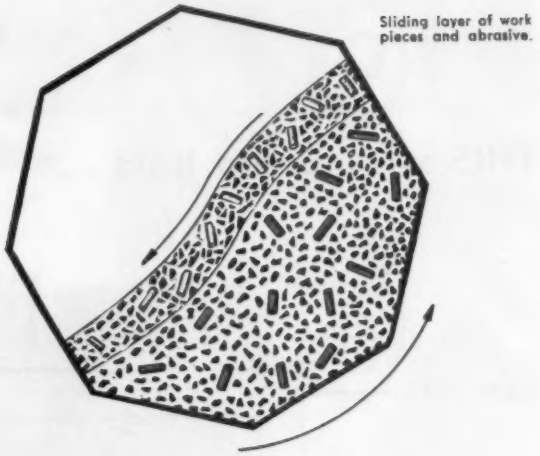
In determining the location and size of pores, the specimen, a flat sheet of plated metal a few thousandths of an inch thick is placed on a photographic film with the coating against the film emulsion. The assembly is held in a card-

Continued on page 59

From summary Technical Report 2057 —National Bureau of Standards.

Permanent mold castings, die castings, powdered metal parts must all be mass finished to keep up with mass production. For these parts . . .

This Is Barrel Finishing



HOW IT WORKS: Metal removal depends on a sliding action between the work and an abrasive material; barrel finishing works on this principle. By balancing total load and barrel speed, a sliding layer of work pieces and abrasive material is formed. Grinding or polishing takes place in this layer without tumbling and without any directional effect. (Sectional view, courtesy of the Norton Co.)

What Is Barrel Finishing?

Barrel-finishing is a precisely controlled method of processing small or large quantities of parts at one time to remove burrs, sharp edges, tool marks, flash and heat-treat scale. It is also widely used to form small radii and prepare surfaces for subsequent finishing such as painting and plating. This finishing method either completely eliminates or reduces to a minimum, hand finishing each individual piece, and gives to parts a uniformity of surface, and appearance not possible by other methods.

Since barrel finishing substantially reduces the number of man-hours that are required to finish individual pieces there is a marked reduction in the costs of surface finishing. Typical cost savings for barrel-finishing as compared with hand finishing are given in the table.

As important as some of the low-cost, high volume production methods are, the tremendous savings that result from the use of die casting, powder metallurgy, screw machine operations and similar processes would be esentially nullified if the necessary surface finishing processes could not keep pace. Barrel-finishing is the natural method to follow the high speed, methods of fabrication.

How Does It Work?

The essential components of the barrel-finishing process are: (a) a rotating barrel, (b) a media (either abrasive or non-abrasive), (c) some type of compound, and (d) water (almost all barrel finishing is done wet).

The basic action of barrel-finishing is a sliding movement of the upper layer of the work load as the barrel rotates. This consists of a rotary movement of the mass of abrasive and parts to the point where the pull of gravity overcomes the tendency of the mass to stay together. The upper layer of the work load then slides (there is no throwing or falling) toward the lower portion of the barrel. Almost all, from 85% to 95%, of the abrading, deburring or polishing occurs during this sliding action. Little or no cutting action takes place while the parts are moving up through the mass from the bottom of the barrel to the point where the slide starts.

The layer of sliding abrasive and parts varies in thickness depending on the size and speed of the barrel, and other conditions such as the amount of water and compound. In the case of a load in a 30″ diameter barrel, rotating at 18 rpm, this sliding layer may be about 3″ thick. The parts directly under the sliding layer are also subject to some abrasion.

What Kind Of Parts Can Be Finished?

Through the proper selection of the type of abrasive media, almost any metal can be successfully finished in a barrel. Probably the only limitation is that the metal should be somewhat softer than the media. The softer metals such as aluminum, brass, bronze, copper and die casting require shorter time cycles to grind, deburr and/or polish than do the harder metals such as cast iron, steel and stainless. One noticeable difference between barrel-finishing and grinding might be noted here. There is never any directional effect on surfaces that have been barrel-finished.

TYPE OF MANUFACTURER	PREVIOUS METHOD	PREVIOUS COST PER PIECE	BARREL FINISHING COST PER PIECE	% OF COST SAVINGS	ANNUAL DOLLAR SAVINGS
BUSINESS MACHINES ZINC DIE CAST PARTS	WHEEL DEBURRING	$ .018	$ .00017	99.1%	$6,632.00
PORTABLE ELECTRIC TOOLS, PARTS	BELT GRINDING	.0453	.0024	94.7%	(10,000 pieces) 429.00
ALUMINUM AND ZINC DIE CASTING	FILING	.00315	.00013	95.9%	
AIRCRAFT INSTRUMENTS	BURR BENCH	.365	.033	90.7%	3,139.09
SCALES AND FOOD MACHINES	BELT GRINDING	.0045	.000075	98.3%	2,857.50
PENCIL SHARPENERS	BELT SANDERS	.008	.0066	17.5%	6,761.30
GEAR MANUFACTURING	HAND FILING	.398	.0635	84.0%	6,680.00
HARDWARE MANUFACTURER	BUFFING WHEELS	.023	.0017	92.6%	2,130.00
MEDICAL INSTRUMENTS	HAND POLISHING	.0425	.0005	98.8%	3,750.00
X-RAY EQUIPMENT	SPECIAL POLISHING MACHINES	.078	.009	88.5%	1,584.00
AIRCRAFT MANUFACTURE	LATHE, BUFFING TOOLS, WIRE BRUSH	.1040	.0029	97.2%	24,490.00
DAIRY DRINK MIXING PARTS	BELT SANDING	.0137	.0021	84.7%	189.70
OIL BURNER PARTS	BUFFING	1.80	.90	50.0%	2,000.00

HOW IT SAVES: By eliminating substantially all labor charges barrel-finishing produces finished or semi-finished parts at savings comparable to those achieved by other high production methods. (Courtesy Almco Div., Queen Stove Works).

The shape and contour of the parts to be finished will determine, to a great extent, the size barrel, the type media and the size of the media particles used. Recesses, angles, fillets, slots, holes and intricate contours can be finished successfully. However, little action can be expected on the inside surfaces of parts.

What Size Parts Can Be Finished?

Barrel-finishing was originally developed to handle small parts that presented extreme difficulty in hand finishing due to their small size. As more and more was learned about the process the size of the parts that could be handled increased.

More recently, finishing methods have been developed in which the parts to be finished are rigidly fastened onto racks which fit inside the barrels. With these fixtures much larger parts are now being barrel-finished since there is no danger of damage to the pieces due to accidental impingement of the parts on each other. Both horizontal and vertical barrels are used with fixtures and the direction of rotation of the fixture with respect to the barrel may be the same, counter current, or either one may be stationary while the other one turns.

What Finish Can Be Secured?

A satisfactory finish for any subsequent operation, or for use as barrel finished, can be secured through the proper choice of abrasive media and compound. Depending upon the work to be done in the barrel and the final finish that is desired; one, two or more separate finishing steps may be required. If for example, die cast parts are to be deburred, polished and colored two barrel-finishing operations will be used.

In general, three types of finish can be secured:

(a) A smooth finish with low microinch reading.
(b) A bright finish with high luster and eye-appeal.
(c) A matte finish.

The abrasive media, the compound, the size load and the amount of water will all depend on the type of finish that is desired.

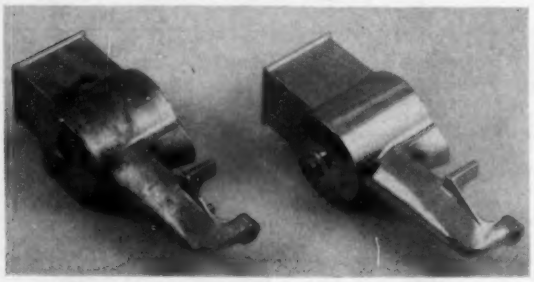
How Is A Barrel-Finishing Operation Set Up?

Experience is probably the only guide that can be given on how to set up the proper cycle. The factors that must be considered, and balanced, are: type and size of abrasive, ratio of abrasive load to work load, kind and amount of compound, volume of water and whether one, two or more operations will be necessary.

When the necessary experience or knowledge is lacking in the plant where the finishing is to be done it is always possible to secure the desired information from one of the companies making barrels, media or compounds. Almost all of these companies maintain well equipped laboratories where this sort of development work for customers and prospective customers is done.

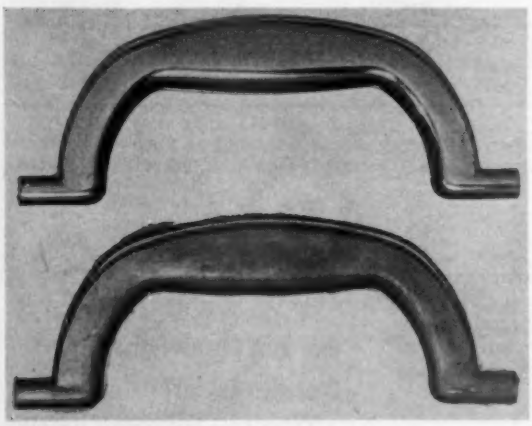
CASE HISTORIES OF BARREL FINISHING

CASE NO. 1: A suitable finish for kitchen appliances



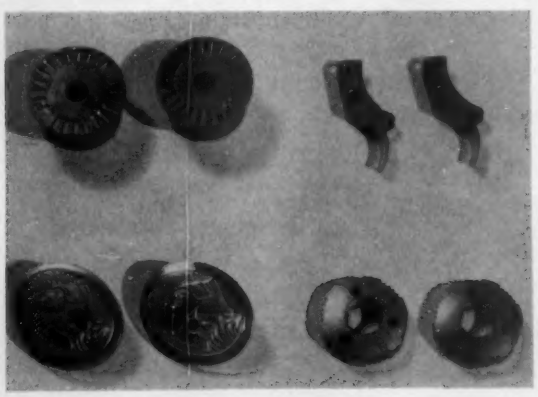
A. Type of Material — Aluminum Die Cast
B. End Product — Meat Grinder Housing
C. Finishing Required — Burnishing
1. Machine — Fixture Machine
2. Quantity — 75 pieces per machine
3. Media — 3/16" hardened steel balls — 300 lbs.
4. Compound — #1 Supersheen Compound (burnishing compound)
5. Amount of Water — Level with top of mass
6. Time Cycle — 1 hour
7. Labor — 35 minutes
8. Material Costs per Load — $1.86
9. Barrel RPM — 18 r.p.m.

CASE NO. 2: Handles need careful flash removal and coloring



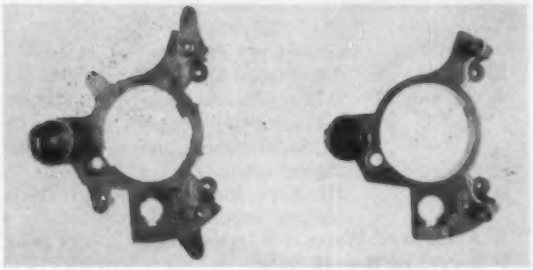
A. Type of Material — Aluminum Die Casting.
B. Weight of Part — 2.97 oz.
C. Finishing Required
First Operation — Polishing
1. Machine — Rubber lined, variable speed drive.
2. Work load — 60 lbs. per compartment.
3. Processing media — 700 lbs. Roto-Finish no. 4-A Britehoning chips per compartment.
4. Compound — 6 lbs. Roto-Finish no. 100 compound per compartment.
5. Water — 6 in. below the mass level.
6. Cylinder speed — 16 rpm.
Processing time — 2 hours.
Second Operation — Brite dipping
1. Dip parts in mixture of hydrofluoric and nitric acids.
2. Rinse parts in mixture of nitric acid and water.
3. Rinse in clean water.
Third operation — Coloring
1. Machine — rubber lined
2. Work load — 10 lbs. of parts.
3. Processing media — 350 lbs. 3/16 in. steel balls, 350 lbs. 3/16 in. diagonals.
4. Compound — 1 lb. Roto-Finish no. 380.
5. Water — 2 in. above mass level.
6. Cylinder speed — 30 rpm.
7. Processing time — 30 min.
Estimated costs for all operations 2¢ per part.

CASE NO. 3: Powdered metal parts can be ground and burnished



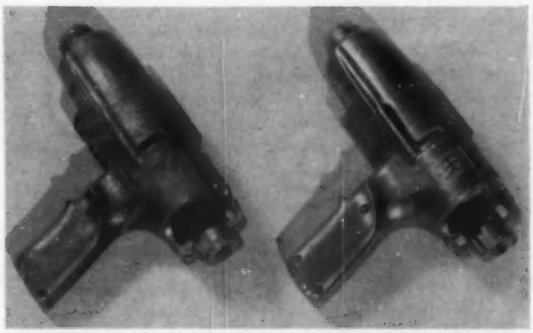
A. Type of Material — Powdered Metal
B. End Product — Trigger Guard, Piston Cap, Stock Ornament for Guns
C. Finishing Required — Grinding (for surface smoothness) and Burnishing
1. Machine — Submerged finishing machine
2. Quantity — 1000 to 2500 pieces per load
3. Media — Supersheen bonded chip — 300 lbs.
4. Compound — #2 Supersheen Compound (grinding compound) #14 Supersheen Compound (burnishing compound)
5. Amount of Water — 200 gallons per tank
6. Barrel RPM — 16 r.p.m.
7. Time Cycle — 2 to 4 hours
8. Labor — 15 minutes
9. Material Costs per load — $.0027 per piece

CASE NO. 4: Aluminum bracket is deburred and flash removed



A. Type of Material — Aluminum Die Cast
B. End Product — Bracket
C. Finishing Required — Deburring and Flash Removal
1. Machine — Standard Loose Processing Machine
2. Quantity — 460 per machine
3. Media — ♯3½ Supersheen Bonded Chip — 1000 lbs.
4. Compound — ♯3 Supersheen Compound (abrasive grinding compound)
5. Amount of Water — 6 inches below top of mass
6. Barrel RPM — 22 r.p.m.
7. Time Cycle — 4½ hours
8. Labor — 10 minutes
9. Material Costs per Load — $1.26

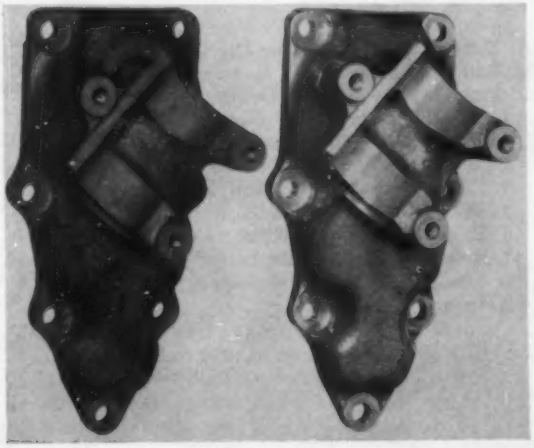
CASE NO. 5: Completely assembled unit is fixture-finished



A. Type of Material — Aluminum Die Cast and Sand Cast

B. End Product — Impact Wrench Housing
C. Finishing Required — Grind for Surface Smoothness
1. Machine — Fixture Machine
2. Quantity — 132 pieces
3. Media — ♯3-½ Supersheen bonded chip for grinding — 1800 lbs.; ¼" and 5/32" hardened steel balls for burnishing — 4800 lbs.
4. Compound — ♯3 Supersheen Compound (abrasive grinding compound), ♯411 Supersheen Compound (burnishing compound)
5. Amount of Water — 6 inches below mass for grinding level with mass for burnishing
6. Barrel RPM — 16 r.p.m.
7. Time Cycle — 1½ hours gringing, ½ hour burnishing
8. Labor — 50 minutes
9. Material Cost per load — $4.12

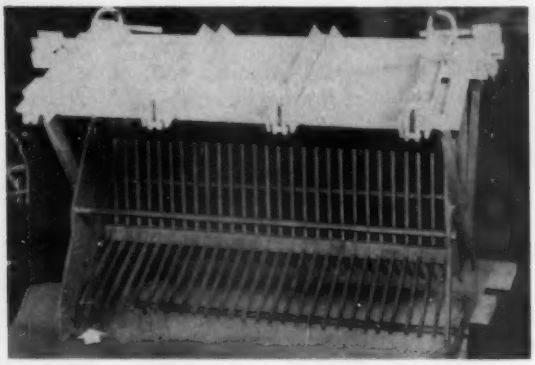
CASE NO. 6: Magnesium permanent mold castings are polished



A. Type of Material — Magnesium Permanent Mold Casting
B. Weight of Part — 6.97 oz.
C. Finishing Required — Polishing
1. Machine — Rubber Lined, variable speed drive.
2. Work load — 50 pieces.
3. Processing time — 30 min.
4. Compound — 4 lbs. no. 11-C Roto-Finish Compound.
5. Water — 1 inch above mass level.
6. Media — 700 lbs. Roto-Finish no. 4-B Britehoning Chips.
7. Cost per part (total) — 2.8¢ per piece.

TURN THE PAGE FOR SOME VERY LARGE JOBS

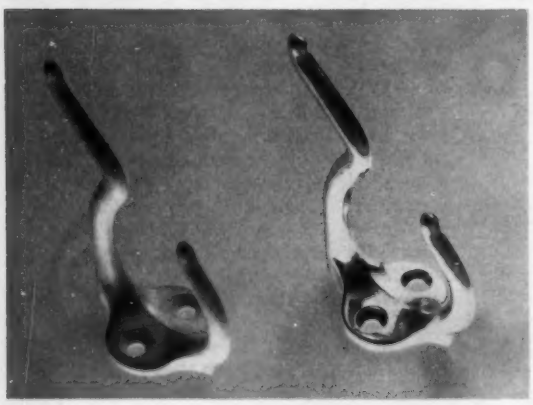
CASE NO. 7: Heavy Grinding is done in fixture barrel



A. Type of Material — Permanent Mold Gray Iron Casting

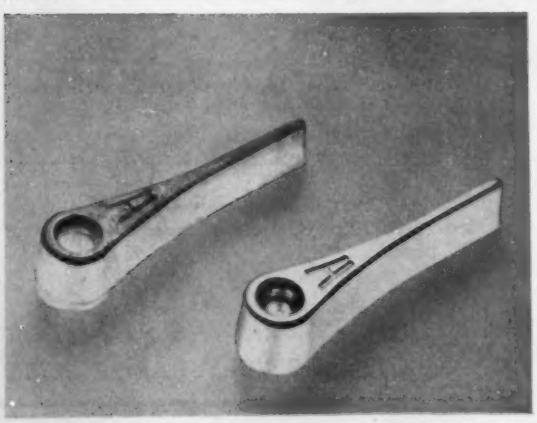
B. End Product — Track for Automatic Pinsetter
C. Finishing Required — Grinding (surface smoothness), Cleaning and Burnishing
1. Machine — Fixture Machine
2. Quantity — 56 pieces per machine
3. Media — #3A Supersheen Oxide Chip — 2800 lbs.
4. Compound — #3 Supersheen Compound (grinding compound)
#7 Supersheen Compound (cleaning compound)
#10 Supersheen Compound (burnishing compound)
5. Amount of Water — 6 inches below top of mass
6. Barrel RPM — 18 r.p.m.
7. Time Cycle — 8 hours total
8. Labor — 40 minutes
9. Material Cost per Load —$3.77 total on all compounds

CASE NO. 8: Aluminum hardware is prepared for plating



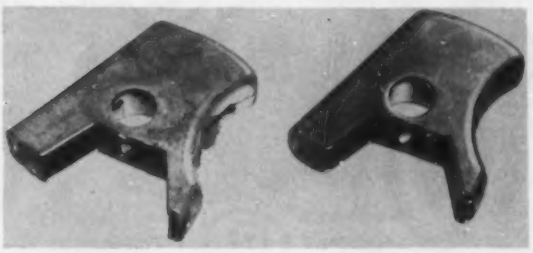
A. Type of Material — Aluminum Die Cast Hanger.
B. Finish Required — Deburring and Burnishing
First Operation — polishing
1. Machine — 29″ x 11″ barrel, neoprene lined
2. Quantity — 300 pieces per charge
3. Media — Clepo Burr-eens, ¼ to ½ inch — 300 lbs.
4. Compound — 6 oz. Clepo 202-S
5. Water — Six gallons
6. Barrel Speed — 18 RPM
7. Time cycle — 5 hours
Second Operation — Burnishing
1. Machine — 39″ x 14″ maple lined barrel
2. Quantity — 300 pieces per charge
3. Media — 5/32″ hardened steel balls — 450 lbs.
4. Compound — 6 oz. Clepo 202-S
5. Water — Six gallons
6. Barrel Speed — 36 RPM
7. Time cycle — 1 hour in barrel after etching, rinsing and desmutting.

CASE NO. 9: Fixture handle must be deburred as first step



A. Type of Material — Zinc Die Casting
B. End Product — Plated Handle
C. Finishing Required — Deburring
1. Machine — 29″ x 11″ barrel, neoprene lined
2. Quantity — 700 pieces per charge
3. Media — 5/16″ to ½″ limestone chips — 300 lbs.
4. Compound — 1 lb. Clepo 162-L
5. Water — 8 gallons
6. Barrel Speed — 18 RPM
7. Time cycle — 5 hours

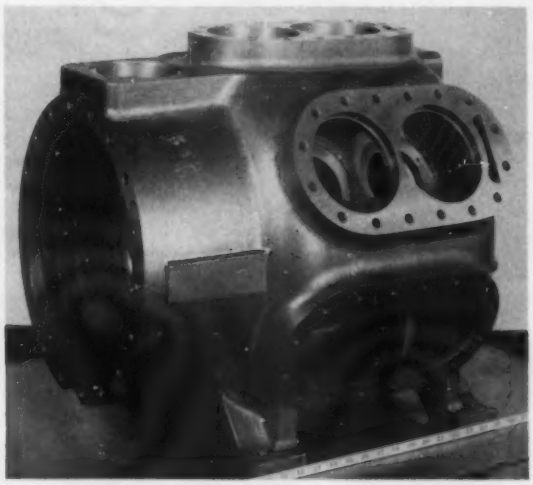
CASE NO. 10: Zinc die castings are burnished at low cost



A. Type of Material — Zinc Die Cast
B. End Product — Trigger

C. Finishing Required — Remove Parting Line and Burnish
1. Machine Standard Loose Processing Machine
2. Quantity — 1200 pieces per load
3. Media — #4 Supersheen Bonded Chip — 700 lbs.
4. Compound — #3 Supersheen Compound (grinding compound), #15 Supersheen Compound (cleaning compound), #10 Supersheen Compound (burnishing compound)
5. Amount of Water — 6 inches below top of mass
6. Barrel RPM — 20 r.p.m.
7. Time Cycle — 4½ hours total
8. Labor — 40 minutes
9. Material Costs per Load — $1.40

THE BIG ONES CAN BE BARREL-FINISHED, TOO . . .

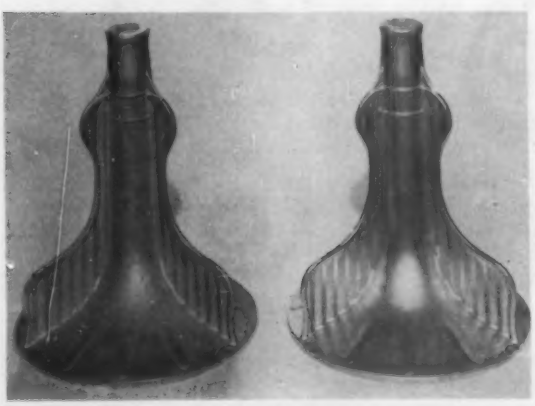


Grey iron permanent mold castings cleaned in a barrel

A. Type of Material — Permanent Mold Gray Iron Casting
B. End Product — Compressor Housing
C. Finishing Required — Cleaning and Break Sharp Edges
1. Machine — Fixture Machine
2. Quantity — 2 per machine
3. Media — #3 Supersheen Bonded Chip
4. Compound — #10 Supersheen Compound (burnishing)
5. Amount of Water — 4 inches below top of mass
6. Barrel RPM — 12 r.p.m.
7. Time Cycle — 20 minutes
8. Labor — 20 minutes
9. Material Costs per load — $3.48

Die cast aluminum washing machine agitators burnished

A. Type of Material — Aluminum Die Cast
B. End Product — Washing Machine Agitator
C. Finishing Required — Burnishing
1. Machine — Special Four-door Fixture Machine
2. Quantity — 16 per machine
3. Media — 3/16" hardened steel balls — 4800 lbs.
4. Compound — Supersheen #411 (Burnishing Compound)
5. Amount of water — Level with top of mass
6. Barrel RPM — 16 r. p. m.
7. Time cycle — 20 minutes
8. Labor — 10 minutes
9. Material costs per load—$1.60



Advertisement

SPECIAL REPORTS ON FINISHING NON-FERROUS METALS

NUMBER I—Decorative, Corrosion-Resistant Finishing with Iridite

Chromate conversion coatings are well known and accepted throughout industry as an economical means of providing corrosion protection, a decorative finish or a good paint base for non-ferrous metals. However, continued developments are so rapid and widespread that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this digest of current information; to bring you up to date on the many ways in which you can combine salable appearance with durability in one finish at a competitive price advantage. Report II on paint base, corrosion-resistant finishes and Report III on chemically polished, corrosion-resistant finishes are available on request.

First, as a basis for this discussion, a "decorative" finish is considered as any chromate film that is used as a final finish in itself. It may be truly decorative in that its sole purpose is to enhance the beauty of the product. For example, a bright chrome-like finish or a pleasing bronze appearance are among the many effects that can be obtained. It may be functionally decorative in that it reduces reflectivity for camouflage purposes or provides a means of color-coding parts. But, in all cases, the Iridite films protect the metal against corrosive attack.

Iridite finishes are now available for all commercial forms of the more commonly used non-ferrous metals, including zinc, cadmium, aluminum, magnesium, silver, copper, brass and bronze. These films can produce a wide variety of pleasing appearances. The basic colors of the Iridite coatings are grouped below by metals.

ZINC and CADMIUM: Metallic bright, light iridescent, iridescent yellow, bronze, olive drab.

COPPER, BRASS, BRONZE: Metallic bright, yellow.

ALUMINUM ALLOYS: Clear, iridescent yellow, brown.

MAGNESIUM ALLOYS: Metallic bright, iridescent yellow-red, brown.

SILVER: Metallic bright.

In addition, many films can be modified by bleaching or by dyeing. Among the dye colors available are various shades of red, yellow, green, blue or black.

Depending upon the metal and the Iridite used, corrosion resistance of clear and bright films ranges from mild passivity to as high as 500 hours in salt-spray; on heavier dark films, salt-spray resistance ranges from approximately 100 to 1000 hours.

It is this combination of decorative and corrosion resistant properties that accounts for the widening use of Iridite finishes. For example, Iridites #4-73 and #4-75 (Cast-Zinc-Brite) make possible for the first time, a combination of lustrous chemical polishing of the as-cast surface of zinc die castings and good resistance to corrosion. Further, in many cases, sizeable savings in the cost of buffing and electroplating are realized.

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

On many steel parts, a simple system of zinc or cadmium plate and bright Iridite is used instead of more costly electroplated finishes to provide a bright, decorative and protective finish with tremendous savings in material, equipment and labor.

In finishing aluminum, where corrosion resistance or paint adherence is the prime consideration, the aircraft industry has all but abandoned the anodizing process in favor of recently developed chromate conversion coatings, among them Iridite #14 and #14-2 (Al-Coat). These formulations and their method of application can be varied to retain the original metallic appearance while providing acceptable corrosion resistance, or to produce a fully colored brown finish that offers exceptional corrosion protection. Again, time and manpower savings are astounding—one company saved at least $15,000 a year on maintenance of racks alone and another $40,000 on materials and labor in only nine months. In addition, of course, hundreds of thousands of dollars are saved by eliminating the need for expenditures for generators, heating equipment and racks.

Iridites are widely approved under both Armed Services and industrial specifications because of performance, low cost and savings of materials and equipment.

In planning or designing, you should consider the many other characteristics of Iridite finishes which may enter into the specific problem. In addition to having decorative and protective functions, these chromate coatings form an excellent base for organic finishes and bonding compounds. They have low electrical resistance. Some can be soldered and welded. The Iridite film itself does not affect the dimensional stability of close tolerance parts.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product requires the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 E. Monument Street, Baltimore 5, Maryland.

For more information circle No. 77 on the Reader Service Card

POROSITY DETECTION

continued from page 51

board cassette, and the basis-metal side of the specimen is exposed to X-rays or radiation from a radioactive material. To insure good contrast, the X-radiation used must be soft. This requirement of low-energy X-rays limits the thickness of the basis material to several thousandths of an inch, since thicker metal absorbs too much of the X-ray beam and requires too long an exposure time. Radioactive iron, nickel, or cobalt held against the plated specimen in a cassette are also adequate sources of radiation.

After a suitable exposure time the film is removed and developed, satisfactory radiographs result from a 3- or 4-min exposure to an X-ray machine, and from a 24-hr exposure to 1uc of radioactivity. Wherever a pore existed in the coating, a black spot appears on the developed film. A fine-grain industrial X-ray film gives the most readable radiograph.

This radiographic method detects pits, voids, and inclusions in the coating to the order of 0.001 in. in diameter. Discontinuities in the basis metal may also be determined by radiographing the metal before plating.

[1] The nature, cause and effect of porosity in electrodeposits, II. Radiographic Detection of Porosity in Electrodeposits, by F. Ogburn and M. Hilkers, Annual Tech. Proc. Amer. Electroplaters' Soc., p. 256 (1956).

[2] The nature, cause, and effect of the porosity in electrodeposits, by F. Ogburn and A. Benderly, Plating 41, 168 (1954).

J. BISHOP & CO. WINS FINISHING AWARD

In a contest conducted by Almco, Div. of Queen Stove Works, Inc., second prize was won by J. Bishop & Co. for their development of barrel finishing procedures for deburring stainless steel tubular parts. The parts, formerly finished by hand scraping, belt polishing, wire brushing and other hand operations are now deburred and polished in Almco barrels. Operating at a rate of 6000 parts per hour, costs have been cut from 0.014 cents per piece to 0.000165 cents per piece. About 500,000 parts per year are now being finished by barrel methods at this company.

COMPLETES FORTY YEARS SERVICE

Gustave Klinkenstein

Dr. Gustave Klinkenstein, president and technical director of Maas & Waldstein Co., has just completed forty years service with that firm. Starting as a junior chemist, Dr. Klinkenstein rose through chief chemist, technical director and vice president to his present position. Many of the techniques used in the manufacture of paints and enamels were developed by Dr. Klinkenstein as were the pioneer work in hammered-effect and wrinkle enamels. He has been active in the New York Paint, Varnish & Lacquer Association; the Industrial Products Finishes Steering Committee and the National Paint, Varnish & Lacquer Association.

HAMMOND MODEL VRRO
Two-Spindle Variable Speed Lathe

STEP UP PRODUCTION—REDUCE FINISHING COSTS with Hammond DOUBLE SPINDLE LATHES

- No "down time" for one operator when the other changes wheel — each operator has his own motor, control and variable speed drive.
- Convenient Variable Speed dial is within arm's reach of the operator — no "climbing" around in back to change speeds.
- Wheel economy and better finish. As wheel wears each operator can increase speed — to maintain constant peripheral speed for uniform and better finish, maximum production and wheel life.
- Available in 3 sizes — two 5 HP, two 7½ HP or two 10 HP.

ALSO AVAILABLE IN WIDE SWING MODEL VRROW

Wide swing construction, with extended bearing housings and spindles, provides additional working space for large, bulky pieces.

Cost reduction is the need of the day — Write for catalog.

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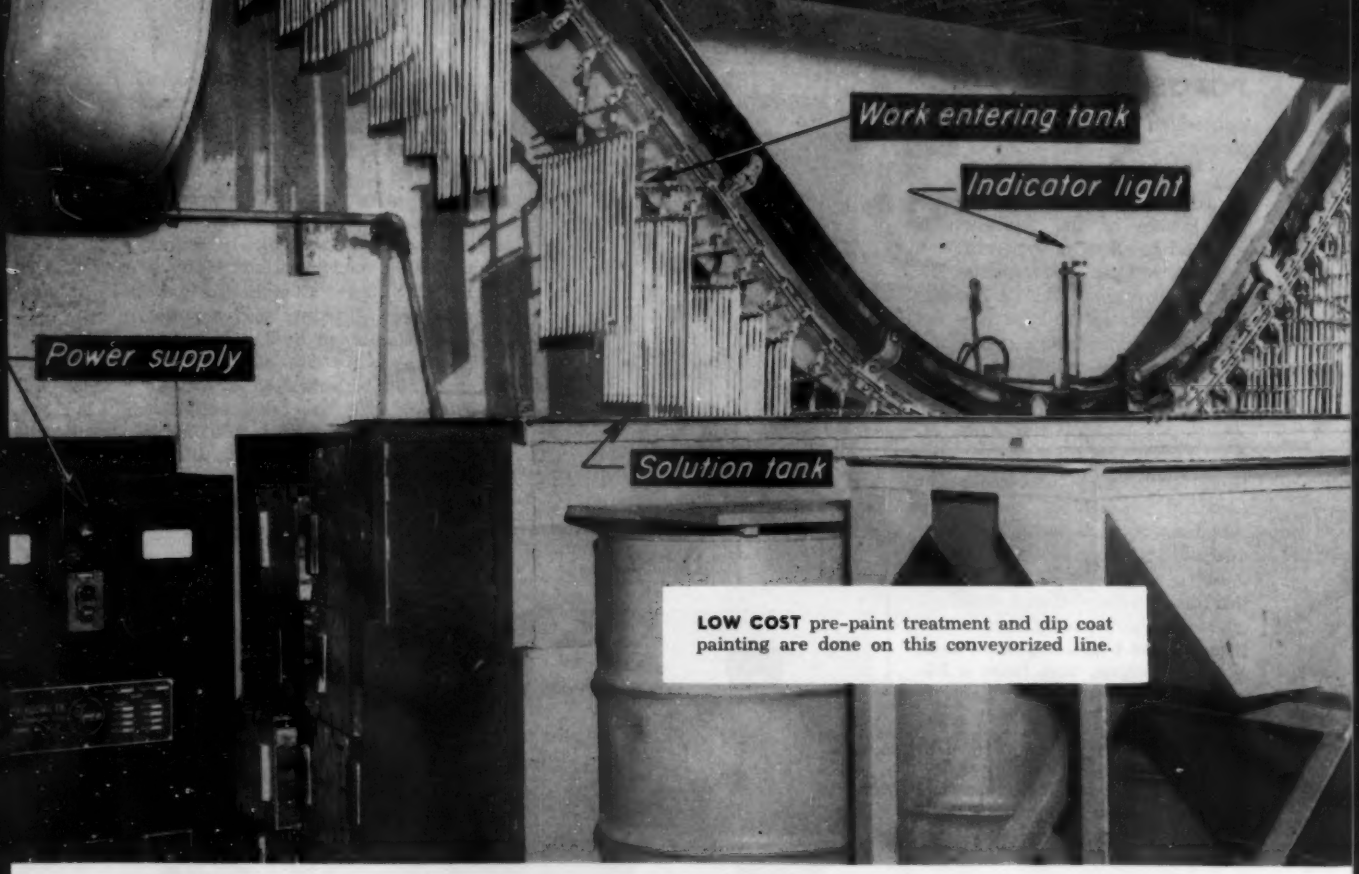


LOW COST pre-paint treatment and dip coat painting are done on this conveyorized line.

For castings and wrought stock . . .

A New Pre-Paint Treatment

A NEW process for the surface treatment of aluminum objects prior to organic coating has been patented.[1] While the process was developed specifically for use with formed strip parts that have to have some forming done on them after coating and must resist severe impact during their service life, the process can be used with castings of all types, forgings, extrusions or any other fabricated form of aluminum or aluminum base alloys.

Instead of a surface film that would give a high degree of mechanical interlocking with the organic coating, this process gives a coating that is both hydrophilic and oleophilic and which forms a chemical linkage with the paint.

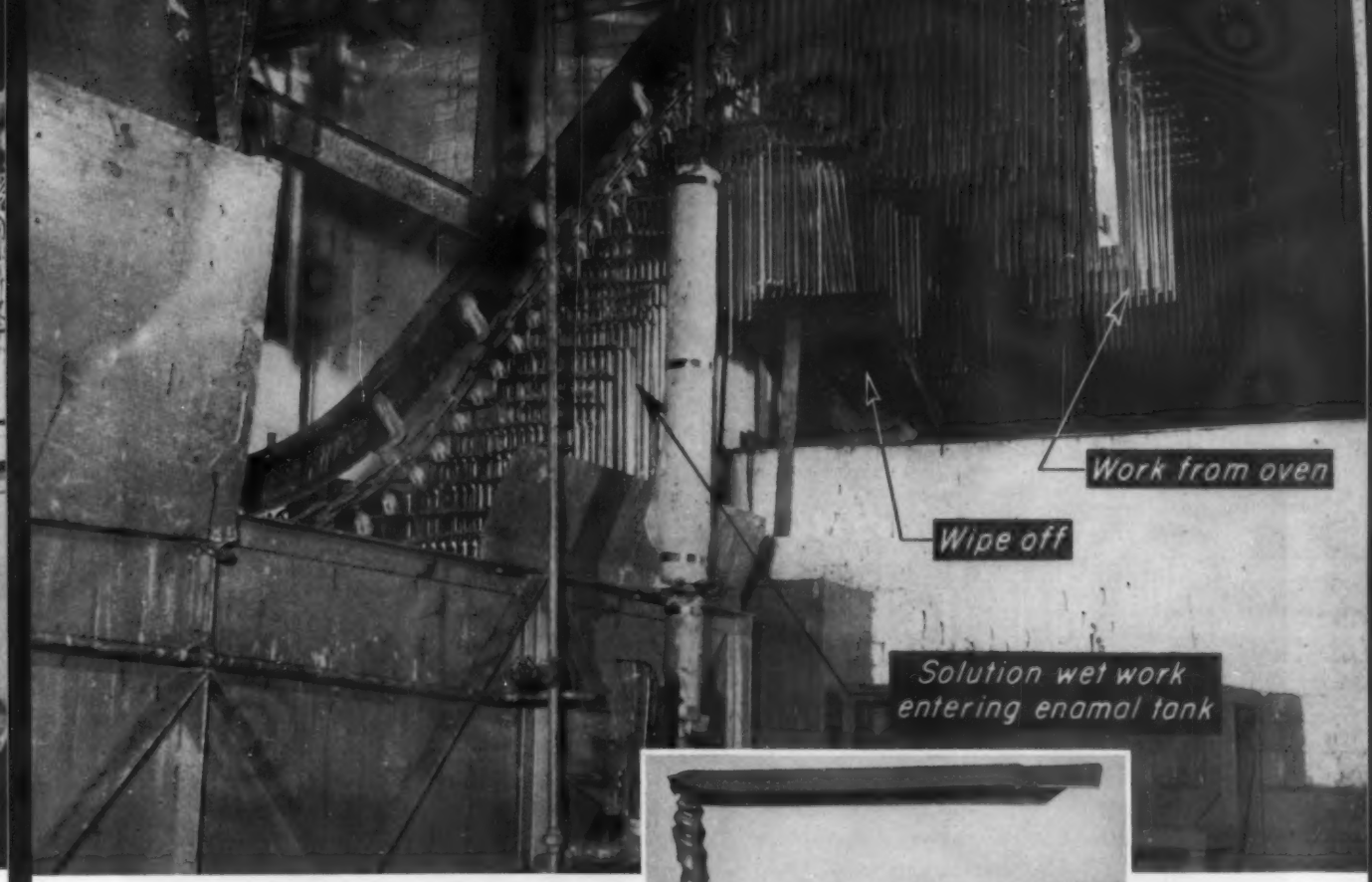
Because the coating formed on the aluminum surface is completely compatible with both water and oleum bases, rinsing and drying of the object after coating is unnecessary and, in fact, may be undesirable.

The process is electrolytic, using a chromic-phosphoric acid bath of controlled composition and pH. Bath composition is given in Table 1.

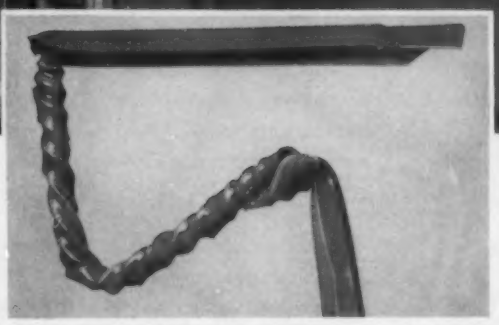
The solution is maintained at a pH of 2.3 or less and bath adjustment is made by additions of both phosphoric and chromic acids. As a rule, greater amounts of phosphoric acid are used to compensate for dragout. Bath temperature is not critical and may be maintained from about 60F to 120F. For convenience the bath is generally operated at about room temperature.

The aluminum article to be treated is made the anode in a direct current system with either a separate cathode or the tank as cathode. Voltage may run from 2 to 30 volts. At the instant of immersion an extremely high current is drawn, but this starts to fall almost instantly and drops off to approximately zero at the surface layer of the desired composition is built up.

The immersion time may be very short, but experience has shown a practical minimum of about 5 seconds with 30 seconds being optimum on articles made of aluminum strip. Naturally this



For Aluminum



COMPLETE ADHESION even under the most severe conditions is achieved with the new pre-paint treatment.

time will vary somewhat depending upon the material and other factors.

After treatment the articles are removed from the bath and drained to remove tears only — they are then ready for immediate organic coating. The actual method of organic coating application is immaterial; dipping, spraying or flow coating are all equally effective.

Two advantages that this new conversion coating is said to give to aluminum base articles are: low cost surface treatment, and a coating that holds to the metal base under all conditions of twisting, impact, etc. An example of the adhesion of a dip coating is shown in Figure 1. In this case, the coating is an alkyd resin base enamel of the type ordinarily made from glycerol, phthalic anhydride and linseed fatty acids. However, this particular type of organic coating is not essential. Any oil varnish base, or rubber or synthetic rubber base paint or enamel may be used. Naturally a brittle coating cannot be used successfully.

No expensive installation is required for either the treatment tank of the power supply. Washing and rinsing are not needed and no drying oven is used. A degreasing operation must precede treatment, but this is true of any similar surface treatment. Vapor degreasing is the prefered method.

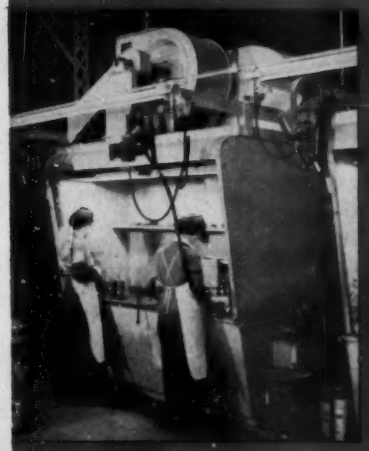
Continued on page 64

Table 1. Composition of Bath

Constituent	percentage range	preferred percentage
Phosphoric acid	1.51 to 8.4 by wt.	1.68 by wt.
Chromic acid (as CrO_3)	0.27 to 1.5 by wt.	0.30 by wt.
Water	balance	balance

Proved Superior

for the safe collection of dust, fine chips and fumes when processing and finishing non-ferrous metals such as MAGNESIUM



PETERS-DALTON *Hydro-Whirl* WET TYPE DUST COLLECTORS

For the proper and safest method of collecting highly inflammable dusts, fine chips and grindings, the Wet Method is BEST. Peters-Dalton Hydro-Whirl Wet Type Dust Collectors are efficient in operation . . . low in price . . . and provide maximum safety to plant and personnel, particularly during what can be hazardous operations, such as grinding, polishing and buffing magnesium alloys.

Illustrated here are four types of PD Wet Type installations. *Upper left*—well ventilated bench for the safe collection of dust produced from portable tool and flexible shaft grinding, polishing and buffing; *upper right* — dust collector for grinding stands and polishing jacks; *lower left* — water-wash type spray booth for removing noxious fumes created while spraying oxidation inhibitors containing fluorides or other toxic compounds on cores; *lower right* — high velocity side hood wet collector for dust, fumes and smoke during a foundry "shakeout" operation.

Whatever your operation, PD engineers can design for you the proper type of Wet Dust Collecting Unit. We will be glad to tell you more—just write, wire or phone.

Now Available: Our informative new brochure for magnesium dust collection and control —

"Wet Method is BEST"

Representatives in principal cities.

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MILLION VOLT X-RAY UNIT INSTALLED

The most powerful x-ray inspection source currently available in a commercial testing laboratory has been installed by Arnold Greene and Co., Inc., a Cambridge, Mass. laboratory specializing in testing and inspection.

The x-ray machine is a 1-million volt Van de Graaff accelerator manufactured by High Voltage Engineering Corp., of Burlington, Mass. The new unit will make available to metal working firms an expanded inspection service for both commercial and military work.

This new machine provides a number of advantages to companies whose inspection requirements call for voltages in excess of 250 kv. These critical inspections at supervoltages are now avaliable not only to companies who do not have the necessary equipment, but may also be used by those concerns having x-ray equipment but whose work load is too heavy for existing facilities and where the amount of work to be done does not warrant further capital investment in inspection equipment.

ELECTRONICS NOW CONTROL INGOT-MAKING AT COLONIAL

According to Martin Sanger, president of Colonial Metals Co., "automation is not only expediting ingot production but it also makes cleaner and more uniform and precise weight ingots".

Recently, Colonial Metals Co. installed an electronically controlled conveyor for pouring its molten aluminum. The unit features a control panel for the adjustment of conveyor speed and automatic pouring. This technique permits the production of uniform predetermined weight ingots to customer specifications.

The most recent major expansion program undertaken by Colonial Metals Co. is the new, enlarged control laboratory. This laboratory was dedicated February 1 and marked to the day the tenth anniversary of the company.

Ten years ago Colonial started operations with two rotary furnaces with a monthly capacity of approximately 500,000 pounds.

Today it operates four furnaces in the brass smelting plant and two in the aluminum plant with a combined capacity of 5,000,000 pounds per month.

get the new booklet on BARREL FINISHING

Abbott's new booklet gives the latest information on barrel finishing by the Abbott Method. It describes equipment and materials and how to use them. *The abbot* introduces to barrel finishers the new Abbott Welded Steel Barrel—now available for the first time. The booklet, "*The Abbott Method of Barrel Finishing*," is a must for methods engineers and production men everywhere.

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LUSTER-ON 52 POWDER was recently developed by The Chemical Corporation for automatic equipment where facilities are not available for added leaching and rinsing.

LUSTER-ON 52 POWDER gives a bright bluish hue; provides lasting corrosion protection against staining, tarnishing and white powder products.

LUSTER-ON 52 POWDER can *now* be used in cases where cost has prohibited use of chromates in the past. For instance, electrical conduit, conduit boxes, screws and builder's hardware, tools, electronic parts, air conditioning parts, automotive parts, cheap toys.

LUSTER-ON 52 POWDER is not only low, low in price, but eliminates expensive handling, space-consuming storage and carboy deposits.

Still available, of course — time-tested Luster-On liquid dips and coatings for all your needs.

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PRE-PAINT TREATMENT

continued from page 61

Time in the treatment tank is an important factor to be considered. As noted above only about 30 seconds are required for treatment. Experience has shown that the rate of travel through the treatment tank is entirely dependent upon the speed of painting and drying.

Material costs must of course be considered as well as power costs. While detailed costs for the installation at Shwayder Brothers, Inc., Denver, Colorado, are not available it is known that they are both extremely low. In speaking of the costs of treatment, it is the opinion of Willard G. Axtell, Schwayder's chief engineer who developed the process, that the total treatment costs . . . that is, direct costs . . . are below the rental that might be charged for the floor space occupied by the power supply and treatment tank.

The illustration shows the set up used by Shwayder for surface treating and dip coating. The parts shown are "U" shaped channels of 24ST aluminum approximately ¼" x ⅜" from a few inches to several feet long. The illustration shows the power supply and treatment tank with the conveyor which carries the parts through the entire finishing cycle; the dip tank with the coated channels emerging from the tank and ready to go into the drying oven. This latter unit operates at 325F and through time is 20 minutes.

It should be noted that the process is *not* applicable to magnesium base alloys . . . it is specific for aluminum. While a similar process is available for magnesium base materials, the bath composition and other factors must be varied somewhat to secure proper coating.

[1]U. S. Patent No. 2,721,835 — Willard G. Axtell — Surface Treatment of Aluminum Articles—assigned to Shwayder Bros., Inc., Denver, Colorado — issued October 25, 1955. This process is available for licensing.

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UP TO 75% in Set-up and Grinding Time

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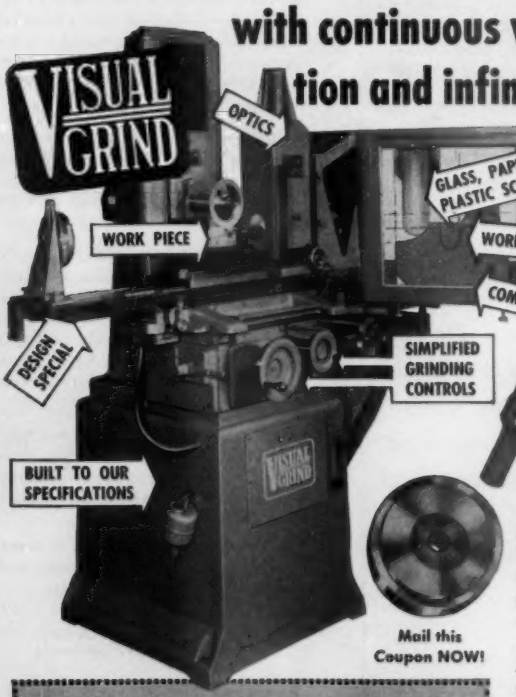

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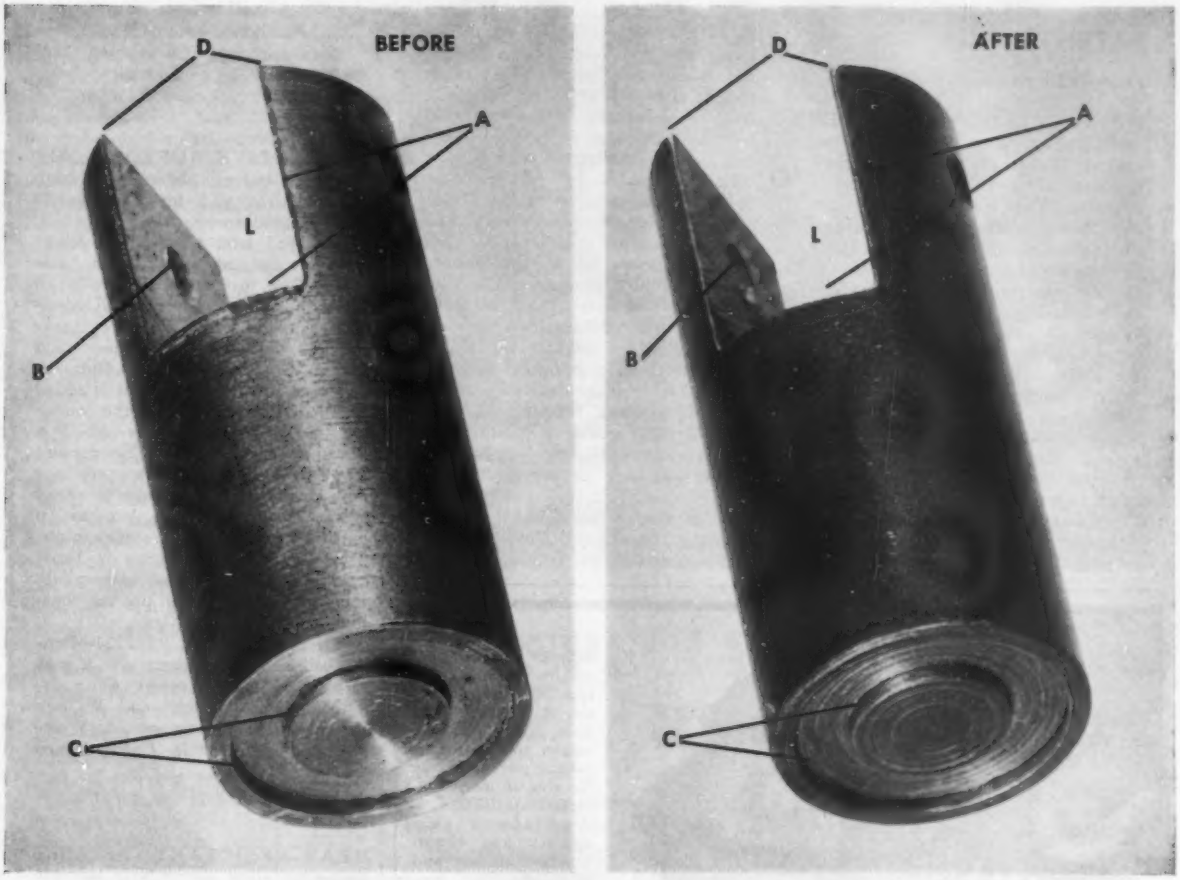
SCHWEGLER NEW JERSEY ZINC VICE PRESIDENT

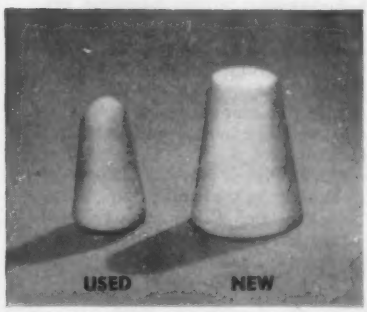
Edward E. Schwegler

Edward E. Schwegler has been elected a Vice President of The New Jersey Zinc Company. He will continue as Comptroller, the position he has held since 1951.

Mr. Schwegler started work at the Company's Denver, Colorado, office in 1916, becoming a traveling auditor in 1918. After spending several years in the Accounting Department of the Palmerton, Pennsylvania, plant, he was transferred to the New York office, and became Chief Auditor in 1937. He served as Assistant Comptroller from 1945 until his appointment as comptroller.



This critical barrel finishing problem solved with "HONITE" Brand CeramiCones



AFTER 550 HOURS use the CeramiCone left retains its exclusive truncated cone shape. Every part of each chip is a working surface—and they're next to diamonds in hardness.

Controls Company of America, Soreng Division, had a major problem in the barrel finishing of mild steel solenoid plungers. Removing milling burrs (A), piercing burrs (B), and burr removal and corner break at (C) with conventional barrel finishing chips was causing much lodging of chip particles in the finished plunger. Two full-time additional inspectors were required to remove these particles.

The company—a leading producer of solenoids—found that a chip large enough to avoid lodging at (C) would lodge in milled slot (L) or would peen corners (D). Too small a chip would fail to remove burrs (A) or would lodge in pierced holes (B).

A "HONITE" Engineer solved this company's problem with CeramiCones—the amazing new precision-molded chips made of high-strength, non-crystalline ceramic. Results: CeramiCones stopped lodging *anywhere* and the additional inspection operation was discontinued. Finishing costs per thousand plungers dropped to ½¢ with improved surface finishes, impingement and nicking was eliminated, and because of faster burr removal the time cycle was cut ½ with improved corner break.

"HONITE" Brand CeramiCones can solve your barrel finishing problems, too. Send us your work samples today for test processing. Write Minnesota Mining and Manufacturing Co., Dept. FF-27, St. Paul 6, Minn.

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PATENTS

continued from page 29

IMPROVEMENT IN THE POWDER metallurgical process of making articles to substantially finished shape from iron, copper or bronze powders. The metal powders are compressed to the desired shape and sintered. The improvement consists of shot peening the sintered article so that the pores on the surface are pushed together and then reheating to cause the edges of the pores to sinter together. These steps are accomplished without substantially changing the shape of the article and result in substantially higher resistance to fatigue.

U. S. Patent No. 2,769,709—Sintered Metal Article and Method of Improving its Fatigue Resistance by Shot Peening—Charles Robert Talmage—issued Nov. 6, 1956.

A POWDERED METAL ARTICLE made by cold compressing a material having a specific analysis by weight of 97½% iron, 1½% graphite and 1% lubricant to a density of between 75% and 85%. The skeleton is then infiltrated with a material compacted by cold pressing to permit its close fit to the skeleton. The infiltrant is composed of 80% copper, 10% iron and 10% manganese by weight. Sintering is at a temperature of from 2050 F to 2100 F for from 30 to 60 minutes. The infiltrated article is heat-treated by heating at 1450 F for from 45 to 60 minutes, quenching in oil and subsequently stress relieving at 400 F for from 30 to 45 minutes. The article so produced is approximately 85% by weight iron and the balance copper and manganese.

U. S. Patent No. 2,768,917—Process of Producing Heat Treated Powdered Metal Articles—Robert L. Pettibone—assigned to Eaton Manufacturing Co.—issued Oct. 30, 1956.

PROTECTIVE SURFACE FOR tungsten and molybdenum at high temperatures and for alloys containing small proportions of cobalt, nickel and iron with either tungsten or molybdenum as the basis metal. The protective surface is an electroplate of chromium and vanadium applied from a bath containing 150 to 350 g/l of chromic acid and 2 to 10 g/l of vanadium. A small amount of acetic acid is added to the bath to increase the working temperature and to obtain a more uniform deposit. The current density is about one ampere per sq. cm. at a bath temperature of from 35 to 50 C. to produce a chromium-vanadium complex plate. The article, after plating is heat-treated in an hydrogen atmosphere for several hours to diffuse the coatings into the articles.

U. S. Patent No. 2,772,227—Protection of Molybenum and Tungsten at High Temperatures—Martin F. Quaely and William C. Lilliendahl—assigned to Westinghouse Electric Corp.—issued Nov. 27, 1956.

HEAT-RESISTANT CASTABLE austenitic alloy particularly suitable for articles that must withstand severe mechanical stress at high temperatures. The alloy is ferrous base and contains from 0.5 to 0.45 percent carbon; 16 to 27 percent chromium; 10 to 30 percent nickel; a total of 6 to 8 percent molybdenum, tungsten and columbium/tantalum, the three last named constituents being present in the following proportions: molybdenum 2.2 percent, tungsten 1.2 to 2.8 percent columbium/tantalum 0.2 to 1.8 percent; a total of from 6 to 12 percent of cobalt and manganese in substantially equal amounts and incidental impurities.

U. S. Patent No. 2,772,155—Heat-Resisting Austenitic Steel Alloys—Friedrich Eisermann and Walter Siegfried assigned to Sulzer Freres, Societe Anonyme—issued Nov. 27, 1956.

METHOD FOR MAKING shell molds in which the refractory material and binder are applied to a pattern of heated aluminum. The aluminum pattern has an anodized surface layer about 0.0001 to 0.0002 inches thick and a layer of carnauba wax on the anodized layer.

U. S. Patent No. 2,771,650—Philip R. White—assigned to General Motors Corp.—issued Nov. 27, 1956.

Besides this ¾₆" diameter size of Tumblex "S" you can order it in four other sizes, up to ⅛". This means top barrel-finishing performance for you, in many different applications. And these new spheres are exceptionally dense and long-lasting.

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Send your work samples to our Sample Processing Department. Learn how Tumblex "S" abrasive can bring the value-adding, cost-cutting "Touch of Gold" to your barrel-finishing operations. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

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A METHOD OF SYNTHESIZING Silicon carbide in which a mixture of carbon and silica (SiO_2) is reacted in a closed container at a temperature of at least 1800C. The patent features a continuous tubular reaction chamber. The container is passed through the furnace and as each section emerges, after reaction, it can be removed from the assembly for discharging.

Patent No. 2,729,542—Synthesis of Silicon Carbide—Edward Van der Pyl—assigned to Norton Co. —issued Jan. 3, 1956— 4 claims.

SMOOTH SURFACED SHELL mold made by adding to the normal silica sand of substantially uniform grain size, a small percentage of silica flour. The sand resin mixture is from 85 to 95 percent by weight of silica sand of uniform particle size, from 5 to 15 percent by weight of silica flour and from 4 to 20 percent by weight of resin binder. The mixture is placed on a heated pattern and held for sufficient time to partially set the resin; the excess sand-resin mixture removed and the shell completely cured.

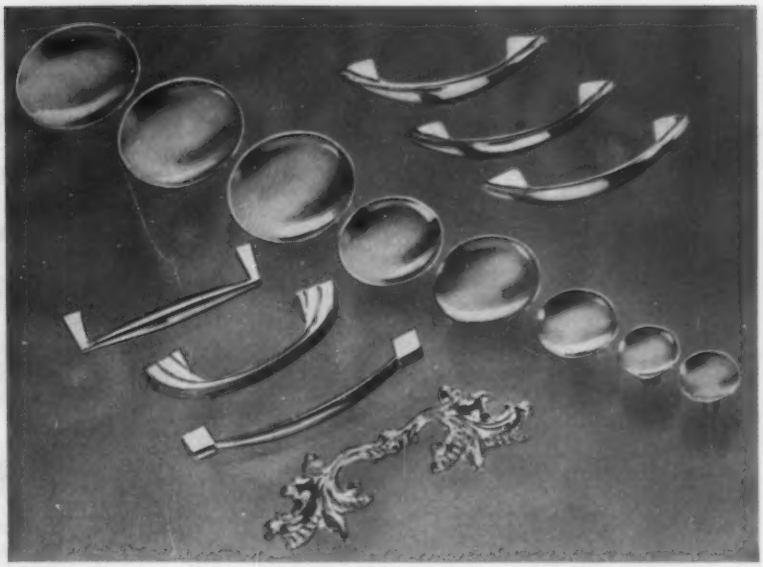
U. S. Patent No. 2,772,458—Method of Making Smooth-Surfaced Sand-Resin Molds—Donald J. Henry—assigned to General Motors Corp.—issued Dec. 4, 1956.

PROCESS FOR INCREASING the permeability of shell molds by baking the formed mold at a temperature of about 1400 F for a period of 1½ hours. This baking treatment converts the binder into an essentially high carbon material without the production of carbon dioxide and removes substantially all of the volatile constituents from the binder.

U. S. Patent No. 2,772,457— Method of Shell Molding—Fred J. Webbere—assigned to General Motors Corp.—issued Dec. 4, 1956.

A POWDER METALLURGICAL PROCESS in which a porous article is made by sintering a compact of powdered refractory material and after sintering the porous skeleton is impregnated with a molten metal. The improvement comprises applying to a portion only of the surface of the sintered compact before impregnation, a coating of finely divided carbon in the form of carbon black or graphite.

Method of Making Powdered Compacts — U. S. Patent No. 2,768,099 — Norman S. Hoyer — assigned to Gibson Electric Co. — issued October 23, 1956.



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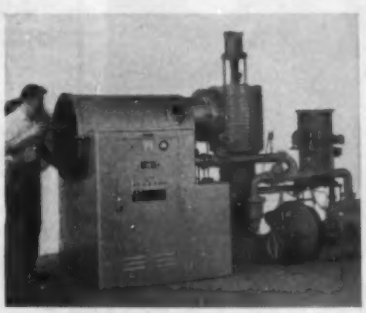
We'll be glad to send you bulletins on our line of coaters, and share our experience in helping you set up operations.



30″ coater—model LC1-30
Typical production: 400 1½″ diameter pieces per cycle; 5 to 7 cycles per hour.

48″ coater—model LC1-48C
Typical production: 1450 2½″ diameter pieces per cycle; 3 to 6 cycles per hour.

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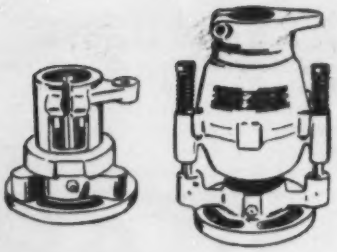

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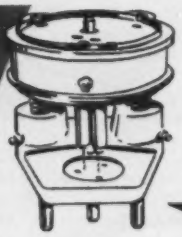
for drilling or tapping on any drill press



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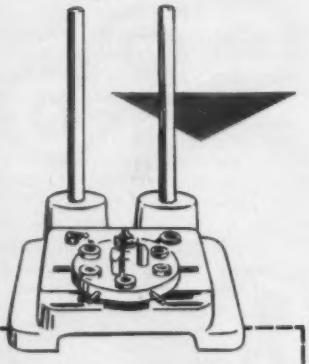

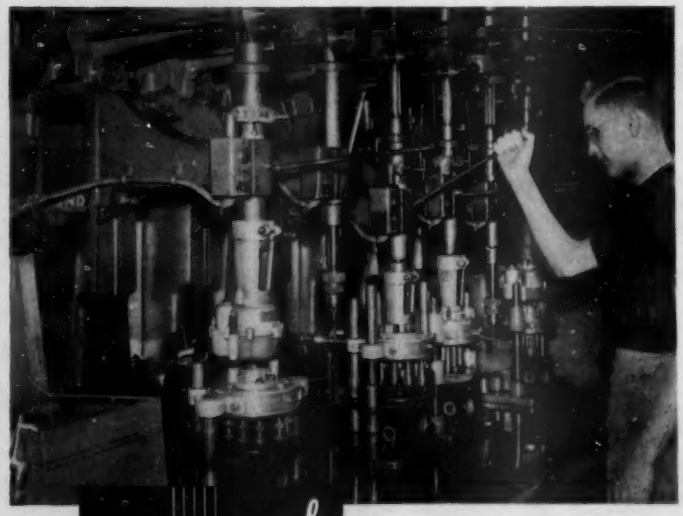

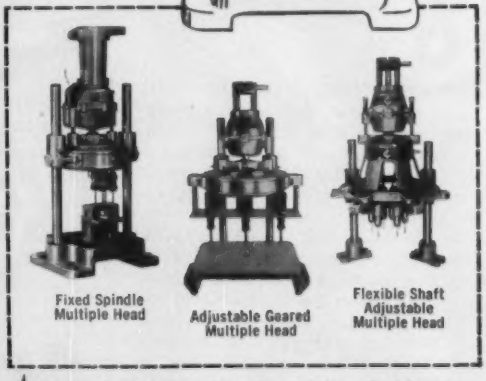

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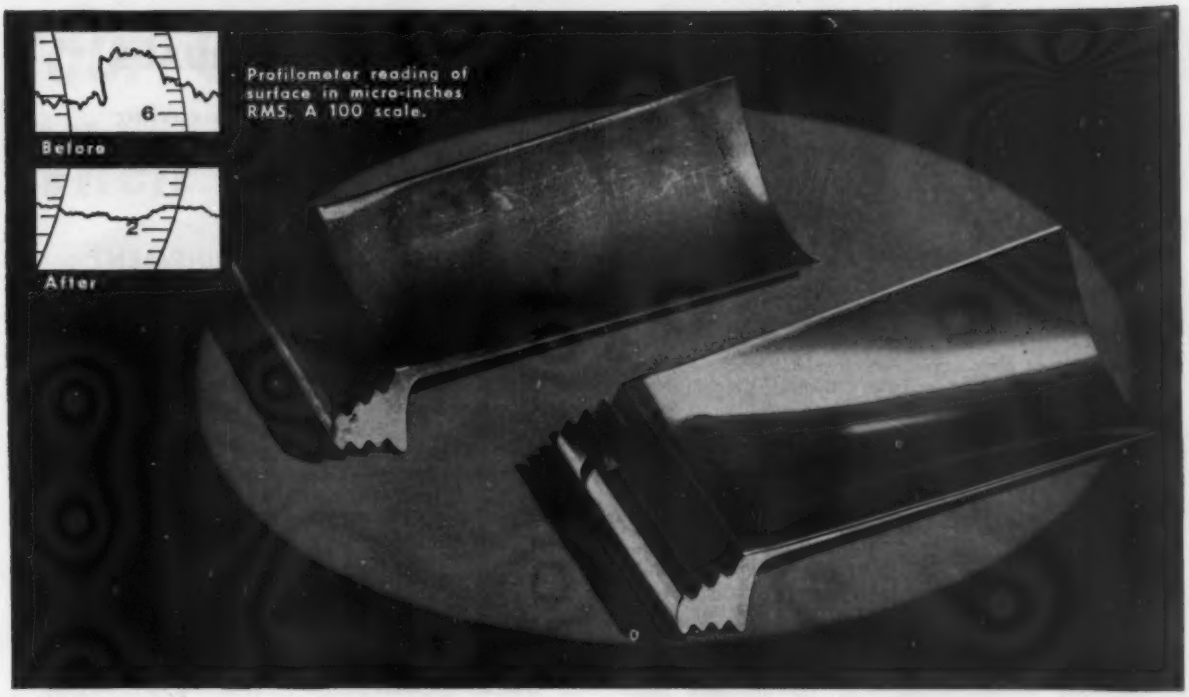

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Roto-Finish, pioneers in precision barrel finishing, offer you a complete finishing service. Savings on deburring, descaling, grinding, polishing, coloring and surface improvement are tremendous. Expensive hand finishing methods can be eliminated.

Roto-Finish processes are controlled to produce the finish you need with no significant dimensional changes. You get absolute uniformity of finish in quantity lots.

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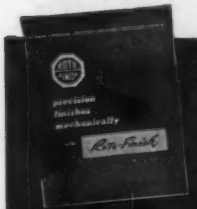

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PROCESSES

Aluminum Castings: 154

Eastern Casting Corp. Div., Eastern Malleable Iron Co., 6 pages, gate fold brochure. Facilities for the production of aluminum die castings and permanent mold castings are described in this illustrated brochure. Included are design and engineering, machine shop, melting, molding, finishing, heat treating, and X-ray inspection facilities.

Zinc Die Casting: 155

The New Jersey Zinc Co., 8 pages. A recent issue of the company's publication, "The Alloy Pot," describes production cost savings of up to 33 per cent with zinc die castings replacing parts fabricated from sheet metal. Nine case histories on zinc die casting use are included.

Casting Complex Shapes: 156

Budd-Stanley Co., Inc., illustrated folder. A casting process developed specifically for one-piece casting of precision components of complicated contour and design is described in question and answer form. Applications of the process in the production of complex microwave transmission components are illustrated.

Powdered Metal Parts: 174

Lux Clock Mfg. Co., Powdered Metal Parts Div., 12-page 2-color brochure. This comprehensive brochure is replete with illustrations and case histories on the use of powdered metal parts to cut costs and improve product performance. The care and precision demanded in the manufacture of powdered metal parts are outlined, and a general guide for such secondary operations such as brazing, welding, soldering, peening, riveting, and machining is included. Standards, specifications and references are charted.

Investment Castings: 185

Dean Precision Castings, Inc., 2-color folder. The company's "Acrocast" investment casting process is described and nine examples of its applications are illustrated. Cost savings, available metals, sizes, weights, etc. are explained.

Fluid Flow Castings: 179

Morris Bean & Co., illustrated folder. Utilizing a mold material which reportedly combines the advantages of sand and gypsum, the Antioch process of aluminum casting is explained. This process is used for castings used in the movement and control of gases and liquids.

Machinery Parts: 196

Haynes Stellite Co., div. of Union Carbide & Carbon Corp. A booklet on machinery parts made of Haynes alloys has been expanded to include data on chemical compositions, physical and mechanical properties, corrosion resistance, and machining of the alloy parts. Case histories are included which show where both standard and special parts have led to increased service time and savings in maintenance costs.

Projected Casting Area: 189

Lester-Phoenix, Inc. A chart showing the permissible projected casting area has been prepared for use with each Lester die casting machine model. The charts are prepared with metal fluidity tabulated at 100 percent, 75 percent, and 50 percent.

MATERIALS AND EQUIPMENT

Pre-hardened Die Steel: 157

Heppenstall Co., 4-page bulletin. Advantages and performance characteristics of "Moldtem," a pre-hardened alloy die steel are discussed. Machineability, purity, density, texture and strength are covered, and examples of products made using the steel are included.

Plastic-Molding Tool Steel: 158

Bethlehem Steel Co., Inc., 4-page folder. Folder 630 describes the company's new plastic-molding tool steel. Basic analysis, heat-treatment, and alloy fortification are discussed, and a table of available stock sizes is given.

Die Lubrication: 159

American Charcoal Co., data sheet. Die lubrication for use with zinc, aluminum, magnesium and brass regardless of injection pressures, weight per shot, thicknesses of wall sections, area, intricacy, cores, or type of equipment or die are discussed. Low air pressure spraying is recommended in using the lubricant to insure that it will not bounce off hot die surfaces.

Stainless Steel Data: 160

Allegheny Ludlum Steel Corp., 8-page data sheet. Detailed information is given on chromium-nickel-manganese stainless steels, types 202, 204, and 204L. Included are such items as intergranular corrosion, mechanical properties, analysis, and stress rupture properties.

Induction Melting Furnaces: 161

Ajax Engineering Corp., 4-page illustrated folder. Folder R-42 describes use of line frequency, induction melting furnaces in a modern zinc and aluminum die casting plant. Diagrams showing arrangement of induction furnaces, zinc die casting machines, and molten metal distribution system are included.

Cold-Chamber Die Casting Machines: 162

A. Triulzi, S.A.S., 8-pages illustrated brochure. Features and accessories of the company's line of cold chamber machines for zinc, aluminum, copper, and magnesium die casting are described in a six-color brochure. Complete specifications of all models are given, and four models are illustrated in detail.

Sprue Handling Tool: 197

Osborn Mfg. Corp. 2-page bulletin. A new tool for safe and easy handling of sprues is described. Made from high strength aluminum alloy, it comes in both 10 and 15-inch sizes. Prices, advantages, and construction features are discussed and illustrated.

Furnace Temperature Control: 177

General Electric Co., 21-page illustrated technical bulletin. Bulletin GER-1206 includes six articles on temperature control of heat treating furnaces. Discussed are basic temperature control systems, thermocouples and control instruments, control elements, and special control systems.

Automatic Fire Safeguards: 178

Selas Corp. of America, 12-page bulletin. Bulletin SC-1006 describes the operation and construction of the company's line of automatic fire checks, which detect, localize and extinguish flashback in mixture supply lines where a combustible mixture of fuel gas and air is distributed to heating equipment. Design and construction features are diagrammed, and charts on performance are included.

Continued on page 72

Your Good Judgment is Confirmed When You Buy . . .

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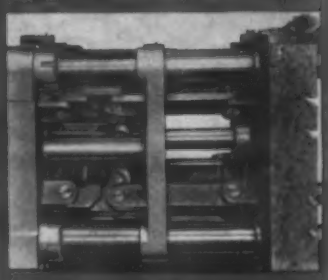

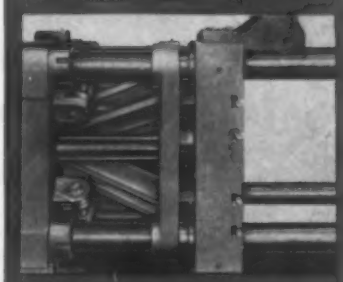

The 4-toggle linkage, an exclusive B&T feature, locks directly under the tie bars. It allows high locking pressures, and since the toggles are self-aligning, no undue strain is exerted on the machine when operating off-center dies; toggle pins are not subjected to a bending load. Toggles have knuckle joints so the slotted toggle pins are placed in compression. One of many definite B&T superiorities.

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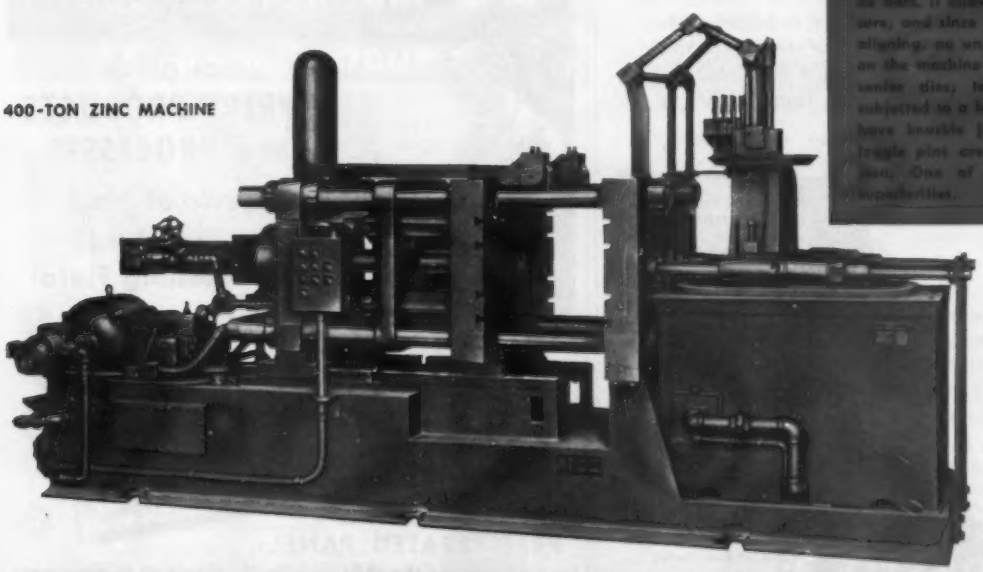

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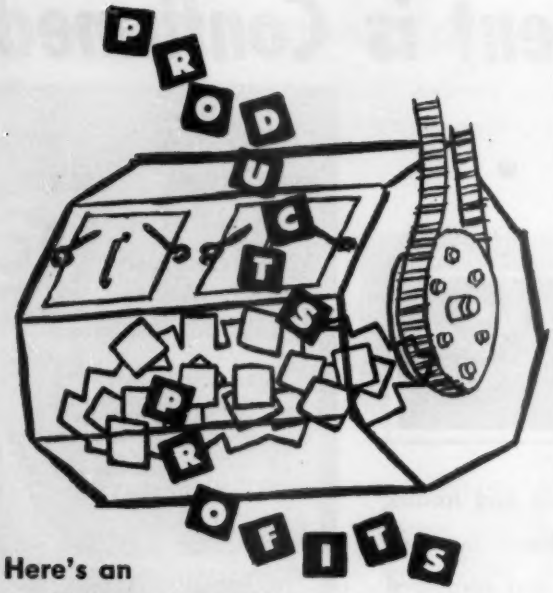

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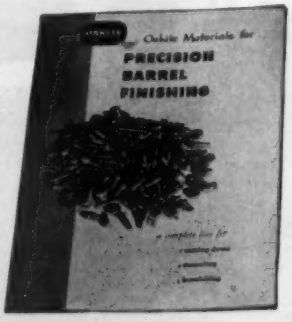

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USEFUL LITERATURE

continued from page 70

Silicone Reference Guide: 175
Dow Corning Corp., 12-page catalog and reference guide. Almost 150 commercially available silicone products are described, including several developed within the past year. Products are grouped by usage — water-repellents, dielectrics, release agents, etc. — with brief descriptions accompanied by charts, graphs, and tables comparing various silicones with materials they displace.

Heat Treating Furnaces: 187
Ipsen Industries, Inc., 2-color folder. Bulletin T-19A describes the company's standardized forced convection heat treating furnaces. The model T-4-600A is diagrammed in detail and the model T-8-1200 is illustrated. Complete specifications on both models are given and their advantages are described.

Die Casting Machines: 190
Hydraulic Press Mfg. Co., div. of Koehring Co., 8-page bulletin. Bulletin No. 5700 describes the company's new and improved line of cold chamber die casting machines, from 200 to 800 tons. A large cutaway view shows the construction features of the machine, and specifications, standard, and optional equipment are covered.

Alloy Stock List: 191
WaiMet Alloys Co., Stock sheet. Alloy steel stocks for immediate shipment are listed in the monthly stock sheet issued by the company. Specifications, quantities, and forms are given.

Fatigue Properties of Steel: 192
Steel Founders' Society of America. "Fatigue Properties of Cast and Comparable Wrought Steel" is the

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title of a paper presented at the 59th annual meeting of the American Society for Testing Materials. The paper covers the effects of steel composition and heat treatment, surface finish, directionality, and section size upon the fatigue properties of 10 different cast and wrought steels.

Shell Molding Resins: **193**

General Electric, Chemical & Metallurgical Div., 12-page catalog. The company's entire product line of phenolic molding materials and resins is described in brochure CDC-322. The catalog includes detailed technical data, special properties and product features.

Metal Stabilizer: **194**

The Michael Scott Co., 8-page brochure. Instructions for the use of "Sun-Brite," the company metal stabilizing product, are given in concise form. The stabilizer is formulated for use with all alloys including aluminum, brass, iron, steel, lead, and zinc. Special notes are included for use in die casting and permanent mold casting.

Foundry Automation: **202**

Carl Wessel Metallurgical Engineering: illustrated folder. Control of three major elements — pouring temperature of the metal, mold temperature, and the adjusted flow of metal into the mold — are three of the advantages of the Unit-Wessel Casting Machine described in a new folder. Included is a brief description of the process and examples of applications.

FINISHING

Thread Cutting Fastener: **163**

United-Carr Fastener Corp., 4-page leaflet. A new thread cutting fastener designed to hold die cast or forged name plates, emblems, and trim against sheet metal surfaces is described. Specifications and available sizes are charted.

Continued on page 74

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ALUMINUM CASTINGS
for future
AUTOMOBILE PRODUCTION

Will they lower costs as well as weight?

By F. S. Ross, Vice-President in charge of Engineering Centr-O-Cast and Engineering Co.

For years, European automobile manufacturers have employed aluminum castings to reduce vehicle weight . . . permitting smaller engines and lower fuel consumption. In America, where fuel economy is not a major problem, the future of aluminum automotive castings depends on different advantages of lightness . . . better steering, rideability, unsprung weight . . . and on cost. Some engineers believe that only by reducing unit costs will aluminum castings replace ferrous metals.

But can modern fabricating techniques make a lower-priced part from a higher-priced raw material? In many cases, the answer is yes. A recent article in Modern Castings magazine, entitled "Centrifugal Casting of Unusual Shapes in Non-Ferrous Metals," outlines how the centrifugal process can greatly cut unit cost. The specific example is a torque converter component, and on this part, savings of more than 20% over previous materials and methods are reported. Similar savings have been effected on other aluminum parts such as power steering housings, transmission housings, and automatic transmission extensions.

Die casting, due to its accuracy and speed, has also resulted in cost reduction with aluminum. As in centrifugal castings, closer dimensions are held than with sand-cast ferrous metals, thus reducing or eliminating finishing operations, and the aluminum alloy's faster cutting speed makes further savings in machining possible.

Although many components of our cars are already cast aluminum, research and development work on gear boxes and engine blocks may open up the largest volume application of all. Engine block research is in an advanced stage, and the next few years should see a major conversion to aluminum here.

With our facilities, our experience (from idea to finished product) in permanent mold, centrifugal mold, and die casting, and our location right in Detroit, we at Centr-O-Cast & Engineering are in an ideal position to lend assistance to not only automotive designers but those in other fields as well. Engineers who have new aluminum applications in mind, and would like to know details of fabricating techniques or costs, will find that we can give them useful information, promptly.

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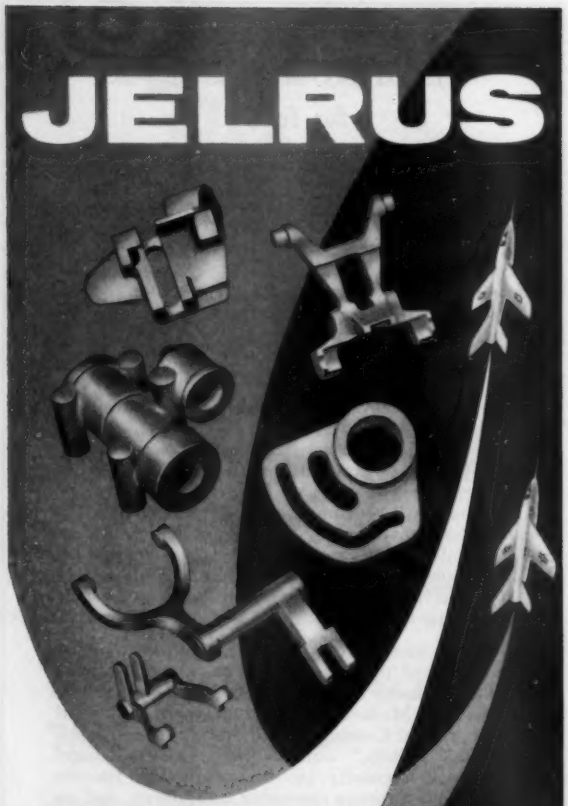

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Precision Tumble Finishing: **164**
BMT Mfg. Corp., 8-page illustrated brochure. A modern precision tumbling process to finish castings previously considered impractical for tumbling machines is described in a revised brochure. Equipment specifications, accessories, and suggestions for barrel selection are included.

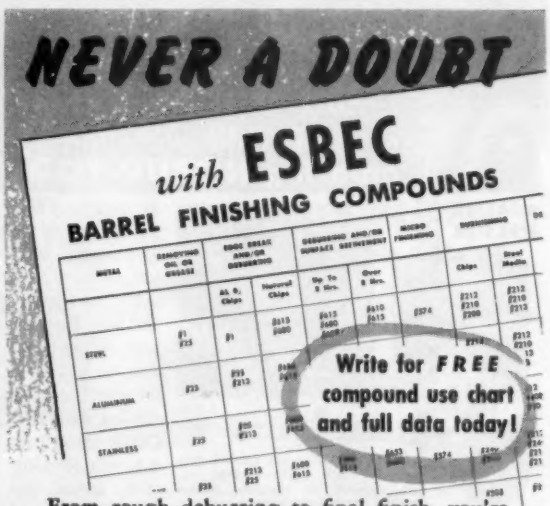
Cemented Carbide Blanks, Cylinders: **165**
General Electric Co., 35-page catalog and price list. Price List GT-314 is a new price list covering made-to-order "Carbaloy" carbide blanks and solid cemented carbide cylinders. It includes ordering instructions and specifies shapes subject to extra charges.

Correct Impregnation Sealant: **166**
Tinchor Products Co., Div. of Ideal Industries, Inc. 4-page reprint. Proper balancing of a number of inter-related factors is the key to selecting the sealant to be used when salvaging porous castings by the impregnation method. These factors are discussed, and the methods for using both plastic and metallic sealants are described and compared.

Barrel Finishing Equipment, Supplies: **167**
Almco Div., Queen Stove Works, Inc., 52-page general catalog. Containing detailed basic material on barrel finishing as well as a description of the "Supersheen" equipment, the book is divided into four subjects: an explanation of barrel finishing and the variables involved; sample processing laboratories; machines and accessory equipment, and medias and finishing compounds.

Brushes, Brushing Machines: **168**
Osborn Mfg. Co., 100-page catalog. Entitled "Brushes for Industry," the plastic bound catalog contains information on selection and use of power brushes, "Brushamatic" machines, paint and varnish brushes, and maintenance brushes. Each brush is illustrated and complete specifications are given.

Continued on page 76



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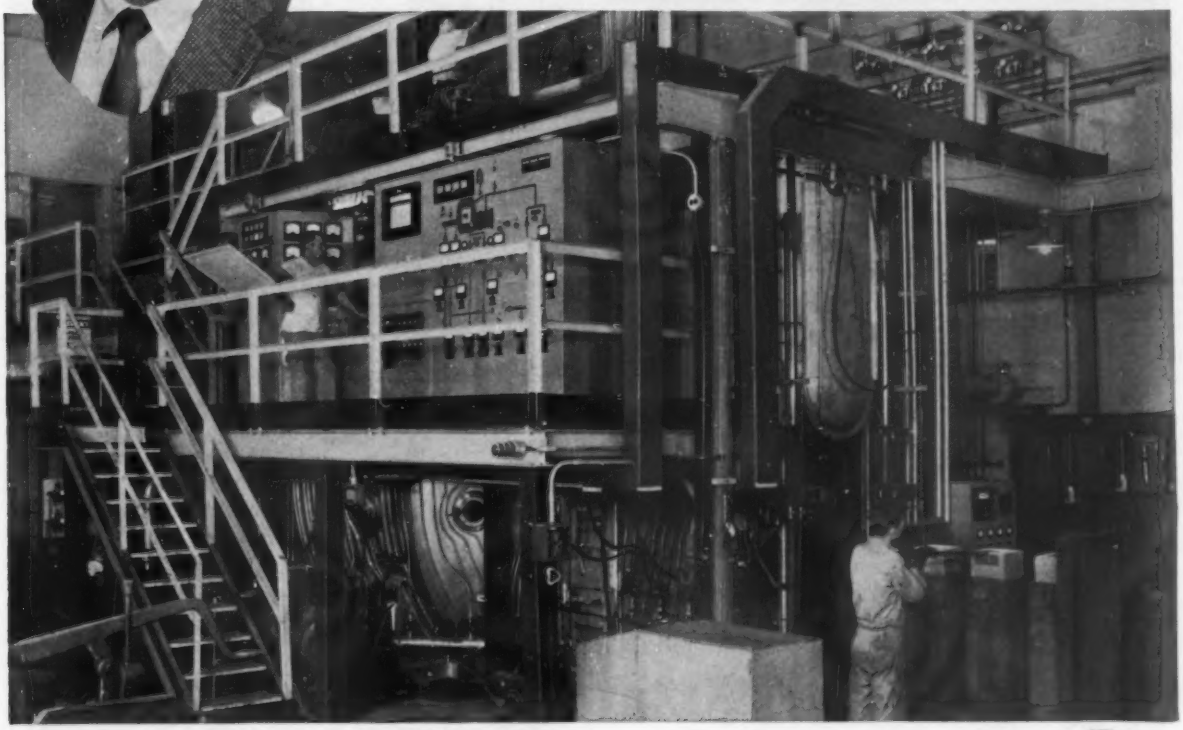
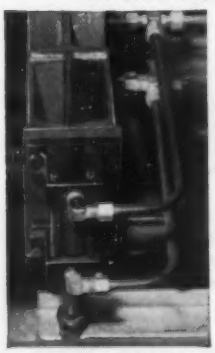


". . . this is why fire-resistant Celanese Cellulube hydraulic fluid is in use in the world's largest vacuum furnace at Vacuum Metals Corporation."



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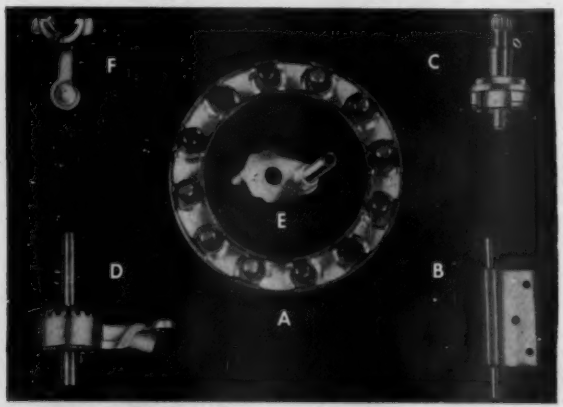
Costs Too High? solution may be—

ALUMINUM and MAGNESIUM

DIE CASTINGS with INSERTS

There are many ways inserts can serve the die casting designer. While maintaining well known advantages, they provide special properties in the die casting, which include such features as improved bearing characteristics, magnetic properties, shear and bending strength, corrosion resistance, wear resistant threads and shafts. The designer can use inserts as fastening devices, such as screws, studs, clips and threaded bushings.



Inserts are held securely in a casting by mechanical interlocking with the cast metal. The shrinkage of the cast metal as it cools makes the metal grip the insert firmly. Sometimes inserts are used to eliminate machining operations on castings.

Frequently curved passages inside of a casting which are impossible to core can be formed by inserting bent tubes. Sealed heating elements gain exceptionally good protection against abuse and excellent heat transfer characteristics when die cast as inserts.

The broad scope of uses for die castings with inserts is indicated in the photo above, which includes: A-fuel cell opening reinforcement ring with cast-in steel dome nuts; B-hinge for outboard motor cover with cast-in steel shaft; C-window regulator rotor with cast-in steel shaft; D-throttle control gear with cast-in brass shaft; E-phonograph control arm with cast-in brass tube; F-refrigerator compressor connecting rod with cast-in bronze bearing.

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PLANT AND EXECUTIVE OFFICES

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Dust Control Equipment: 169

Pangborn Corp., 16-page reference bulletin. Covering the complete range of dust control equipment and accessories, Bulletin 922 describes the importance of dust control to industry in relation to reduced maintenance costs, employee morale, and commercial utilization of dust by-products. Condensed descriptive information on the company's line of dust control equipment is included.

Carbide Tool Grinders: 170

Hammond Machinery Builders, Inc., 16-page catalog. Catalog 260 describes and illustrates the company's complete line of carbide tool and chip breaker grinders. Specifications are given on 13 new models.

Metal Coatings Catalog: 176

Markel Co., 4-page catalog. Complete information is given on the company's line of heat-proof protective coatings designed to protect metals from scaling and corrosion at temperatures as high as 2100F. Four basic coating types are described, along with data on application, methods of applying, and temperature ranges.

Abrasive Wheel Data: 181

Manhattan Rubber Div., Raybestos-Manhattan, Inc. 36-page net price and data book. Book No. 6465 lists rubber and resinoid bonded grinding wheels used by industry, with consumer net prices shown for all quantities. It provides a comprehensive picture of the sizes, shapes, and types of grain available for industrial grinding wheels.

In-Use Grinder Applications: 182

Mattison Machine Works, illustrated booklet. Entitled "Case Histories," this booklet contains 14 illustrated case histories of difficult and unusual surface grinding applications. Included are applications being performed by automotive plants, machine tool builders, makers of tool steel products, and other metalworkers.

Spray Washing Compounds: 184

Magnus Chemical Co., Inc. 4-page illustrated folder. Bulletin No. 73 describes three new "non-foaming" spray washing compounds. Specific uses for each are discussed, and their non-foaming characteristics are described. Included are general directions for use.

Epoxy Resin Compounds: 195

Smooth-On Mfg. Co., 4-page technical folder. Technical Bulletin No. 10 contains a complete description of techniques involved in using epoxy resin compounds for casting. General handling characteristics of epoxies for casting are given, and aspects in curing are discussed in detail. The company's "Metalset" and "Sonite" epoxies are also described.

Solvent-Free Paint Vehicle: 198

Reichold Chemicals, Inc. 24-page magazine. A recent issue of the company's publication "By Gum!" contains a report on "Rezamul," an alkyd resin emulsion developed as a paint vehicle which can be used without conventional solvents. Complete specifications and physical properties are charted and explained.

Chromium Plating Anodes: 199

Metal & Thermit Corp., 2-page bulletin. Four styles of round lead-alloy anodes for chromium plating are described. Both smooth and ribbed anodes are included, and conductivity, long life, and hook contact are discussed.

Barrel Processing Compounds: 200

Magnuson Products Corp., 4-page bulletin. Barrell processing is discussed as to function, fixed factors of production, variable factors for achieving results, and control of testing and production. Included are descriptions of the company's line of "Permag" barrel processing compounds.

Grinding and Polishing Machines: 201

Curtis Machine Div., Craborundum Co., 4-page bulletin. Seven models of the company's "600" series of abrasive belt grinding and polishing machines are described. Complete specifications are charted.

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FINISH

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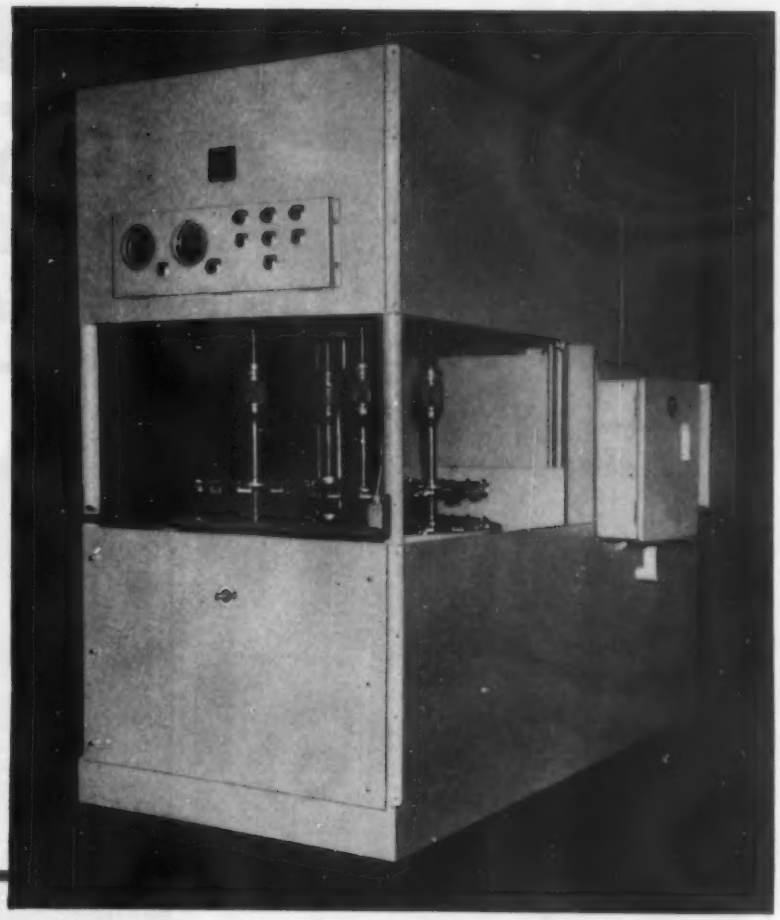
Spin-Finish



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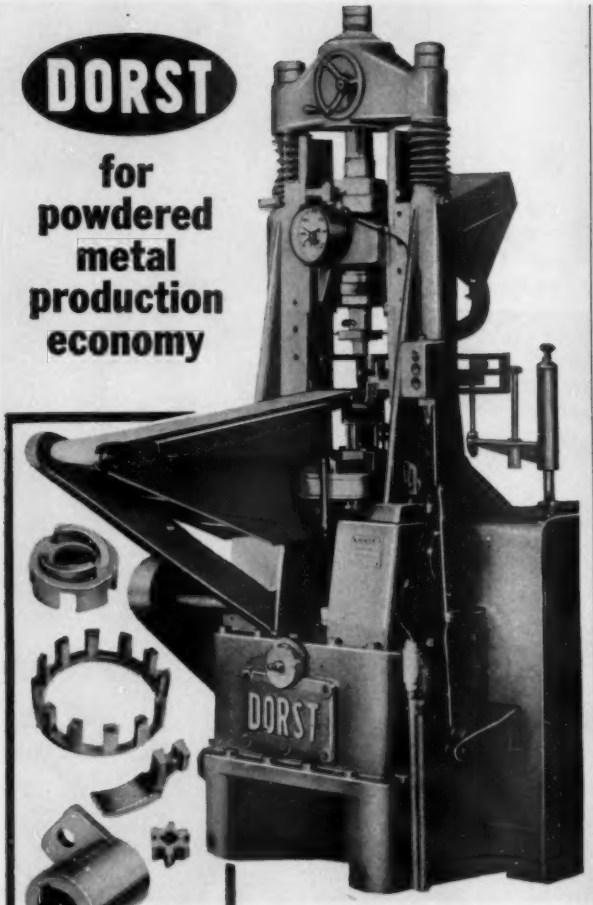

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Fire-Resistant Hydraulic Fluids For The Die Casting Industry

Part 2: Aqueous Base Types

by W. H. MILLETT
Carbide and Carbon Chemicals Company
A Division of Union Carbide and Carbon Corporation.

THE concept of developing fire resistant hydraulic fluids around the well-known inertness of water was first reduced to practice on a substantial scale by the U. S. Navy in their search for less flammable aircraft hydraulic fluids. The original work on this problem was done at the Naval Research Laboratory with the cooperation of industry and has been thoroughly discussed in the technical literature[1,2]. The term "hydrolube" was coined by the Navy as being descriptive of fluid lubricants containing substantial quantities of water as a base. Thus "hydrolube" is a generic term rather than a trade name and can be correctly applied to any product of this type.

In 1946 a laboratory program was initiated that was directed towards the adaptation of the fluids developed for aircraft to the somewhat different requirements of industry. It was necessary to develop fluids with higher viscosity that could be used satisfactorily under the continuous operating conditions employed in a modern plant. Such fluids would have to be rugged and would have to compete performance-wise with conventional petroleum hydraulic oils. In 1947, the first industrial, hydrolube-type, fire resistant hydraulic fluids were marketed. Since that time they have become well established and have spread to a host of industries where the use of less flammable hydraulic fluids is a paramount safety consideration [3,4,5].

Properties of Aqueous Safety Fluids

Before aqueous, fire resistant fluids can be used successfully, the user must first be familiar in a general way with what they are and how they differ from conventional hydraulic oils. These fluids consist essentially of from 35 to 60 percent water for nonflammability, a glycol, and a water-soluble thickener and lubricant to give body or viscosity to the fluid. In addition, the fluid will contain carefully selected additives that impart corrosion preventive properties as well as anti-wear and lubricity characteristics to the finished product. Thus, it can be seen that the final fluid is a carefully balanced formulation designed to meet the exacting requirements of modern industrial usage.

Certain properties and performance characteristics of these fluids are of particular interest to the industrial user.

Fire resistance of aqueous-base fluids depends on the water content, and they are considered to be essentially nonflammable as long as the water content is maintained. When the water is allowed to boil away or to evaporate by prolonged exposure to elevated temperatures, the residual fluid will burn when ignited. Experience indicates, however, that the major industrial fire hazards involve ignition of sprays or mists of flammable fluids when lines break and packings or seals fail. The resistance of the water-

. . . MORE ON FIRE-RESISTANT FLUIDS

This is the second of a series of basic articles on the different hydraulic fluids currently available for use in die casting machines and presses operating in or near hazardous areas. Subsequent articles will be:

March — Phosphate Ester Based Fire Resistant Hydraulic Fluids, by F. H. Langenfeld, Monsanto Chemical Co.

April — Steps To Take When Installing Fire-Safe Hydraulic Fluids, by Charles R. Schmitt, E. F. Houghton & Co.

May — (Title to be announced), this final article will deal with the experience of a large die casting company.

base fluids to burning has been evaluated by several methods including incendiary gunfire, spontaneous ignition, hot exhaust manifold, and spray flammability tests[6,7,8]. The spray flammability procedures have used hot and molten metal, electric sparks, burning gasoline and wood, and oxy-acetylene flames as potential fire sources. All of these tests indicate that aqueous-base fluids as formulated will not ignite under the same conditions that will invariably result in "flash" fires with petroleum hydraulic oils. In fact, it has been demonstrated that under certain conditions aqueous-base hydraulic fluids will act effectively as fire extinguishing agents.

Viscosity or body is imparted to aqueous fluids by the incorporation of a water-soluble thickening agent. This means that the viscosity of the finished product can be varied by adjusting the quantity of the thickener in the finished formulation. Thus, it is possible to select a fluid having the proper viscosity for the mechanical equipment involved. Representative viscosity characteristics are shown in Table I and are compared with typical viscosity values for a medium-grade petroleum hydraulic oil. A comparison of the low temperature viscosities of these fluids shows that the aqueous fluids have significantly lower viscosities at low temperatures than do conventional petroleum oils of comparable viscosity at 100 F, Table I.

Corrosion Protection is a most important consideration for any water-base product. Careful attention has been directed towards this problem in the development of these fluids. Both laboratory and extensive industrial experience have shown that aqueous hydraulic fluids can be safely used in conjunction with the common materials of construction such as steel, aluminum, brass, or copper under normal operating conditions. Although fluids of this type cannot always be evaluated by conventional test procedures, it is of interest that water-base hydraulic fluids successfully pass the standard ASTM test for rust preventive characteristics (ASTM Desig. 665-53T).

Seals and Packings encountered in the hydraulic systems of die casting machines have generally shown no deleterious effect from aqueous base fluids. For this reason, no special seals or packings are required when converting equipment to the use of these products[9].

Table II presents rubber swell data for typical hydrolube-type fluids under standard test conditions. Based on these data as well as the experience that has been accumulated, it is safe to assume that the use of the aqueous fluids does not present a seal problem. One exception to this general statement is the use of cork impregnated seals. Although such products have been used successfully in die casting systems with water-base fluids, it is believed to be preferable to replace them with a more conventional rubber seal in view of the softening tendency that water exerts towards cork.

Wear Resistance is an important point to consider before converting any system to aqueous hydraulic fluids. By far the greatest industrial experience with these fluids has been accumulated in hydraulic systems powered by vane-type pumps. Field service experience and laboratory test data combine to show that aqueous fluids can be used satisfactorily in such systems and that, with proper attention to hydraulic system maintenance, replacement of pump parts is not significantly higher than with standard petroleum oils.

Laboratory tests have been run in a circulating system. Tests were run for 750 hours at 1200 rpm and a pressure of 1000 psi. Fluid temperatures were maintained at 150 F throughout the tests. Data presented in Table III give typical wear results as compared with those obtained using widely used petroleum hydraulic oils. Wear losses for all the fluids are considered to be acceptably low.

Shown in Figure I is an eccentric ring from one of these 750-hour pump tests using an aqueous fluid. It will be noted that the surface of the ring is quite smooth with no abnormal wear pattern. Another ring from a test involving a different type of vane pump was run for a 1000-

TABLE I
Typical Viscosities Aqueous-Base Hydraulic Fluids

	Viscosity, SUS 100° F.	0° F.
Fluid A	201	3,300
Fluid B	306	5,500
Fluid C	554	11,000
Medium Grade Petroleum Hydraulic Oil	250	18,000

TABLE II
Typical Rubber Swell Data For Aqueous Fire Resistant Hydraulic Fluid

Type of Rubber	Linear Swell, % (5 days at 158° F.)
Natural	1.0
Buna S	1.6
Buna N	3.5
Neoprene	1.1 – 2.0
Butyl	0.0 – 0.8
Silastic	0.0 – 2.0

TABLE III
Vane Pump Test Data
Test Conditions

Pressure	1000 psi
Duration of Test	750 hours
Fluid Temperature	150°F.
Speed	1200 rpm

Fluid Tested	Total Weight Loss of Pump Parts, Milligrams
Petroleum Oil A	909
Petroleum Oil B	242
Aqueous Fluid C	392
Aqueous Fluid D	330
Aqueous Fluid E	534
Aqueous Fluid F	85

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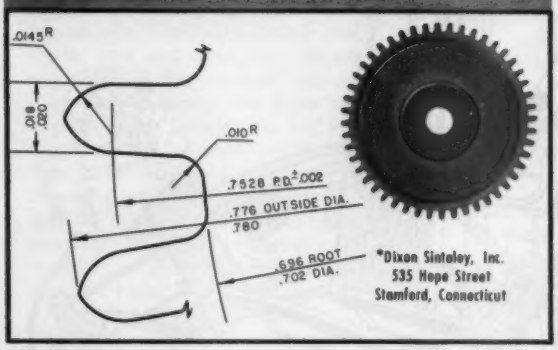

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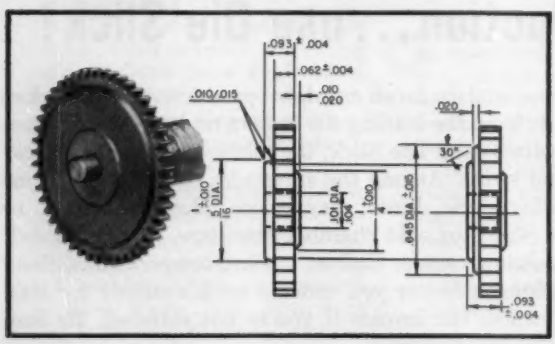

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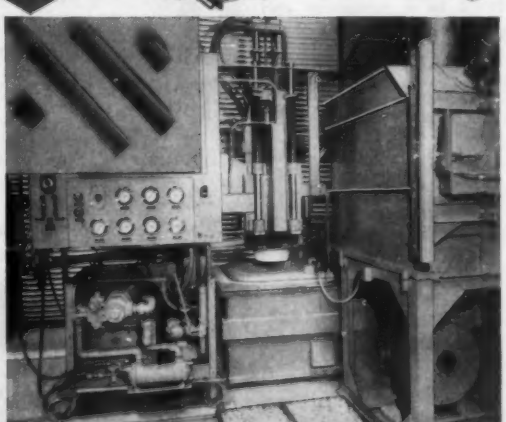

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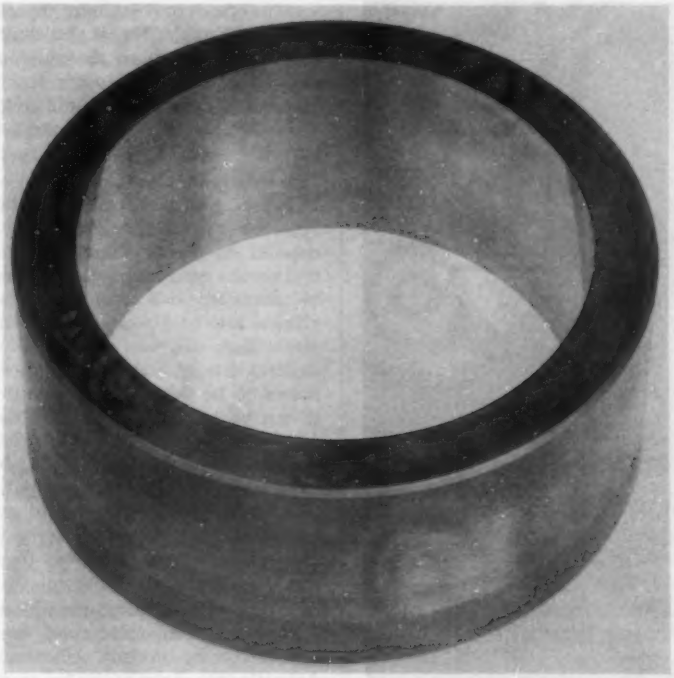

1. ANTI-WEAR CHARACTERISTICS of synthetic fluids are shown by a vane pump ring after 1000 hours of operation.

SPECIAL CONSIDERATIONS that should be borne in mind prior to installing an aqueous fluid in a hydraulic system are, in general, inherent with such products and do not represent major problems as long as they are understood initially.

Solvent Effect on Paints:

All of the currently available aqueous-base fluids will soften or lift many of the conventional types of paints and coatings. This can be serious if the fluid is installed in a hydraulic system without first checking for the presence of materials that might be affected. It is, therefore, advisable to remove all paint from the inner surfaces of hydraulic equipment which may come in contact with the fluid unless it is definitely known that the paint will not be affected. There are available a number of resistant finishes.

Vapor Pressure:

Because of their water content, aqueous-base hydraulic fluids are characterized by high vapor pressures at elevated operating temperatures. This may result in loss of water and, in some instances, loss of volatile inhibitors. For this reason, continued use of water-base fluids at temperatures in excess of 150 F is not recommended. This limitation is not a serious one since good hydraulic maintenance procedures dictate that hydraulic oil temperatures should not rise above this limit. Water loss has not been a problem in standard hydraulic systems. In general, these losses will range from as low as a few tenths of a percent per year for a relatively tight hydraulic system to as high as three to four percent for the same period of time if used without any adjustment.

Grease Contamination:

Conventional greases are not soluble or readily dispersible in aqueous fluids. Care should be taken to prevent overgreasing of parts in contact with the fluid, since this may result in accumulation of excess grease on filters or screens with resultant clogging.

Zinc and Cadmium:

Zinc and cadmium metals are frequently dissolved by aqueous fluids with resultant soap precipitation. The use of galvanized metal zinc or cadmium-coated parts should be avoided.

hour period, and again the anti-wear characteristics are considered to be excellent.

Experience in other types of pumps has been quite limited. In general, it can be stated that relatively low pressure systems appear to present no problem regardless of the type of pump used, but that high pressure systems may, in some instances, involve special considerations. Currently, considerable work is in progress to determine the suitability of various pump designs for aqueous-base hydraulic fluids.

Installation of Fire Resistant Fluids

The proper installation of aqueous-base hydraulic fluids is probably the most important single consideration if they are to be used successfully[10,11,12]. The system should be cleaned as thoroughly as possible prior to installation of the fluid. Ideally, this includes draining all oil from sump, lines, and cylinders and, in addition, removing any sludge or deposits that may have accumulated during previous service. It is realized that complete cleaning is not always feasible because of inaccessibility or mechanical limitations. In any case, as much oil as possible should be drained off and the system should be flushed and operated with a minimum quantity of the fluid that is to be used. The flush fill should be drained immediately after use so that suspended oil and sludge will be removed. The system should then be filled with fresh fluid.

During the early stages of operation, particular care should be paid to filters, since frequently the removal of sludge, oil residues and paint is incomplete. This can give rise to filter clogging and resultant pump starvation if filters are not watched carefully and the elements replaced as needed. Undoubtedly, some petroleum oil will remain in the system. Small amounts of residual oil will not interfere with the performance of the aqueous fluids but they do detract from flame resistance. Accordingly, it is ad-

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visable to remove them insofar as it is possible. Since petroleum oils are lighter than the aqueous fluids they will rise to the top of the sump and can be skimmed or siphoned off while the system is static.

To a large extent, the exact details of preparing a hydraulic system for fire resistant fluids will depend on the available facilities and on the mechanical set-up that is involved. If a series of machines are to be converted, the same flush fill can be used for several. Steam cleaning has been found to be very effective where it can be easily utilized. The use of carbon tetrachloride or other chlorinated solvents should be avoided. Fuller's earth or activated clay type filters should not be used since they will tend to remove necessary additives from the fluid.

The procedures and precautions that have been mentioned may appear to be unduly laborious. Actually, all of the indicated steps are in strict accordance with recommended hydraulic oil practices. The important considerations are that the system be cleaned initially and that it be maintained as clean as possible. The best answer to the successful use of aqueous-base hydraulic fluids has been good housekeeping and sound maintenance procedures.

Control of Aqueous Fluids During Use

For optimum results it is advisable to subject aqueous-base hydraulic fluids to periodic control tests during use. Since the viscosity will increase if water evaporates from the fluid, viscosity is a convenient means of measuring the water content. Fluid suppliers will furnish charts or tables showing the amount of water to add for any given viscosity to restore the fluid to its original viscosity.

Only distilled, deionized or steam condensate water should be used for make-up, since hard water may cause inhibitor precipitation. Normally, control tests are conducted at three or six month intervals. More frequent examination is sometimes recommended for the first few months of operation. Viscosity control has not been a serious problem or limitation in using aqueous-base hydraulic fluids.

Continued on page 88

PARKER RUST PROOF CO. BUILDS NEW PLANT

Its sixth manufacturing plant is now being built by the Parker Rust Proof Co. The new facility will have 40,000 sq. ft. of manufacturing space and be in full operation by next June. The new manufacturing facility will replace the present warehouse carried in St. Louis and will give replace the present warehouse stocks of principal chemicals now carried in St. Louis and will give customers in that area the same fast and economical delivery and service furnished to manufacturers in other areas where similar establishments are located.

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In order to decentralize and to render faster and more efficient service for users of magnetic materials, the Edmore, Mich. plant of General Electric's Metallurgical Products Department has been made the Magnetic Materials Section of the department. General manager of the newly formed section will be Mr. E. E. George. The new section will have full responsibility for the manufacture and marketing of permanent magnets and specialty resistors.

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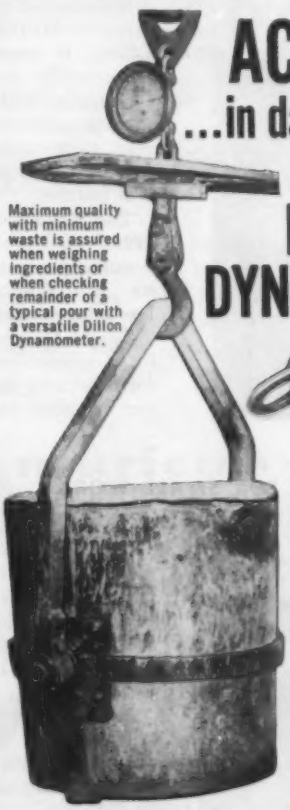

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NEW PRODUCTS AND DEVELOPMENTS

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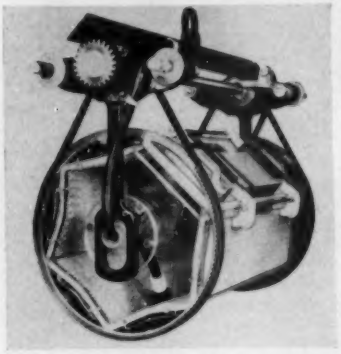
BARREL PLATING CYLINDER HAS NEW BELT DRIVE



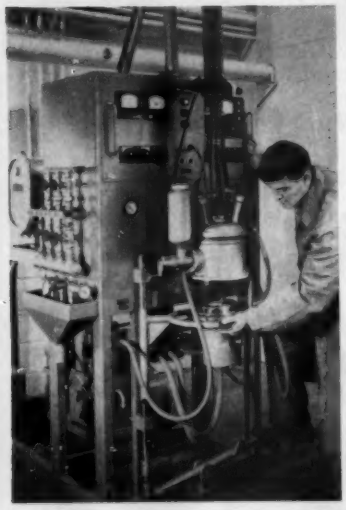
A new Mercil type barrel plating cylinder features a belt drive to simplify and minimize maintenance time and cost.

The cylinder is driven by a standard cogged V-belt, which eliminates the use of a gear series. Because there are no moving parts on the cylinder, wear and parts replacement are eliminated, according to the manufacturers.

The barrel is designed for total submersion during the plating process, increasing plating speeds and insuring thorough plating action. Double flexible dangler contacts are used with the barrel, carrying current into the cylinder through both ends. Cylinder hangers are completely insulated from contacts and hanger pins.

Hanson-Van Winkle-Munning Co.
For more informaiton, circle No. 205 on the Reader Service Card

LABORATORY FURNACE SIMULATES PRODUCTION CONDITIONS



A laboratory arc-melting vacuum furnace featuring flexibility and easy operation can simulate conditions in a large production furnace. Designated the VA-L200C, it uses inter-changeable consumable or non-consumable electrodes, and can handle high melting point metals as well as iron, nickel, copper and their alloys, and many metallic carbides and borides.

The furnace can be operated in either an inert atmosphere or at reduced pressure down to 5×10^{-4} mm. Hg. The capacity is from a few ounces to several pounds.

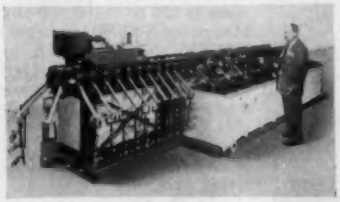
The water-cooled stainless steel furnace chamber has two windows for observing the crucible. A copper crucible, available in several sizes and shapes, is set in a water-cooled jacket and cannot contaminate the melt.

A metal bellows permits movement of the electrode head in all directions. Its height is adjustable electromechanically. The push buttons for this adjustment, a switch for high-frequency ignition, and the regulator for the arc current are all mounted on the handle of the electrode.

The operating panel of the switch cabinet contains all control instruments for arc current, arc voltage, furnace pressure, valve controls, switches, and control lights.

Consolidated Electrodynamics, Corp.
For more information, circle No. 208 on the Reader Service Card

PLATING UNIT BUILT FOR SMALL WORK



After three years of development, a small, compact automatic plating machine for handling large quantities of small parts has been announced. Dubbed "Little Steve," the unit measures seven feet wide and 10 or more feet in length.

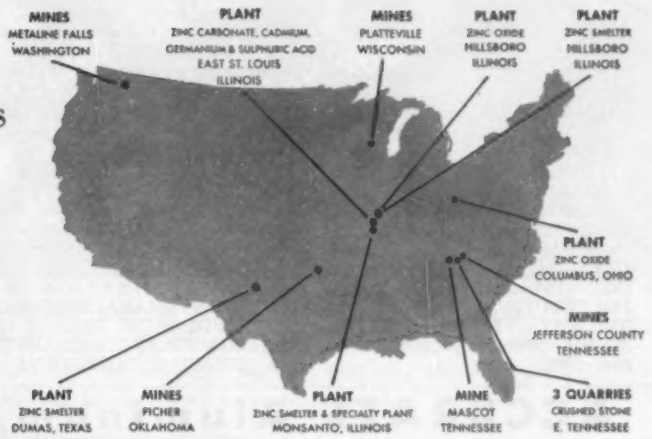
Among its uses are plating electrical parts, door hardware, plumbing fixtures, pistons, and small appliances. It is also suited for anodizing or other electrochemical immersion processes.

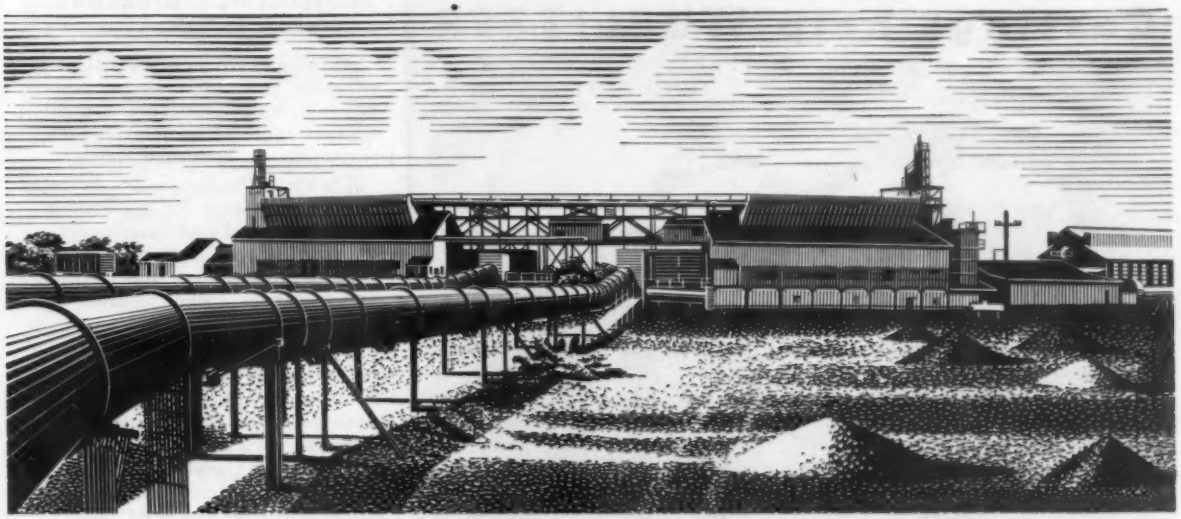
Because of the machine's low overall height, no overhead construction is necessary. It is shipped from the factory as a complete unit and can be installed and in operation within a few hours.

Frederic B. Stevens, Inc.
For more information, circle No. 211 on the Reader Service Card

American Zinc and its products

from A *to* Z





DUAL OPERATION AT HILLSBORO, ILLINOIS

(1) The Oxide Division supplies American process lead-free and leaded zinc oxide, as well as French process zinc oxide. (2) In the Metal Division, Prime Western, Select, Brass Special, Intermediate and High Grade slab zinc are produced. For complete picture of American Zinc operations, see map above.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

Distributors for

American Zinc sales Company

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

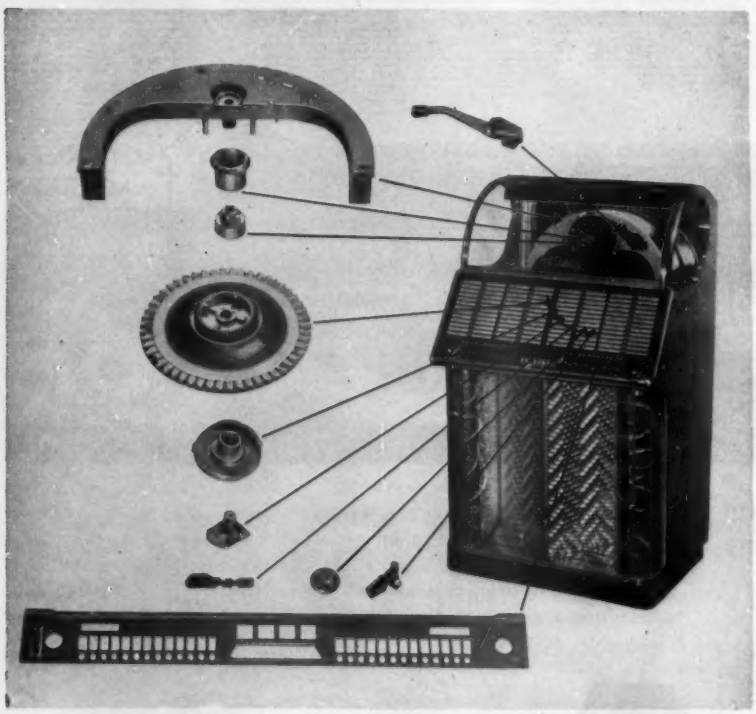
For more information circle No. 12 on the Reader Service Card

HYDRAULIC FLUIDS

continued from page 84

1. NONFLAMMABLE HYDRAULIC FLUIDS; Murphy and Zisman; *Lubrication Engineering;* Vols. 5 and 6, pp. 231-235, 264-269 (1949).
2. AQUEOUS NONFLAMMABLE HYDRAULIC FLUIDS; Brophy, Fitzsimmons, O'Rear, Price and Zisman; *Industrial and Engineering Chemistry;* Vol. 43, p. 884 (1951).
3. INDUSTRIAL USES OF SOME POLYETHER SYNTHETIC LUBRICANTS; Millett; *Iron and Steel Engineer;* pp. 51-60, August 1948.
4. SOME INDUSTRIAL EXPERIENCES WITH SYNTHETIC LUBRICANTS; Sweatt and Langer; *Mechanical Engineering;* pp. 469-476, June 1951.
5. FIRE RESISTANT HYDRAULIC FLUIDS FOR DIE CASTING (AQUEOUS-BASE); Millett; *Precision Metal Molding;* December 1954.
6. FLAMMABILITY OF THE HIGHER BOILING LIQUIDS AND THEIR MISTS; Sullivan, Wolfe and Zisman; *Industrial and Engineering Chemistry;* Vol. 39, p. 1607 (1947).
7. DETERMINATION OF IGNITION CHARACTERISTICS OF HYDRAULIC FLUIDS UNDER SIMULATED FLIGHT AND CRASH CONDITIONS; Hansberry; Tech. Report No. 64, CAA, April 1947.
8. Factory Mutual Engineering Division, Loss Prevention Data Sheet 7-2, Hydraulic Fluids, dated November 1951.
9. THE EFFECT OF HYDRAULIC FLUIDS ON SYNTHETIC RUBBER; Crosland, *Proceedings National Conference on Industrial Hydraulics;* Vol. VIII, October 1954, pp. 190-194.
10. Panel Discussion, *Ibid.,* Vol. VII, October 1953, pp. 173-183.
11. Panel Discussion, *Ibid.,* Vol. VIII, October 1954, pp. 195-208.
12. DESIGN, OPERATION AND MAINTENANCE OF HYDRAULIC EQUIPMENT FOR USE WITH FIRE RESISTANT FLUIDS; National Fluid Power Association Report, March 1955.

ACCURATE Aluminum, Zinc and Magnesium Die Castings help WURLITZER



. . . produce an outstanding high fidelity phonograph at lower cost

■ To help maintain its reputation for high quality products that are competively priced, the Wurlitzer Co. specified ACCURATE die castings. They were sure that every die casting would meet every specification. Cast to close tolerances, these castings required little or no machining, are light in weight, and are ready to use as cast.

Whether it's aluminum, zinc or magnesium die castings, ACCURATE is completely set up to help you with your requirements.
Contact us today for prompt action.

Aluminum, Zinc and Magnesium Die Castings

ACCURATE DIE CASTING CO.
3089 E. 80th STREET • CLEVELAND 4, OHIO

For more information circle No. 11 on the Reader Service Card

NEW PRODUCTS—cont.

ALL-ELECTRIC ACTUATOR . . . needs no fluids

An all-electric proportional positioning device for use in conjunction with electronic control systems requires no intermediate pneumatic or hydraulic fluids.

Known as the Series "D" Actuator, it is suitable for application on single seated and double ported control valves, butterfly valves, proportioning pumps, mechanical and electrical speed controllers, etc.

Manufacturers claim it is also applicable for many complete all-electric systems where other methods of control have not been practical, such as automatic control involving transmission of signals over long distances, in toxic atmospheres, or where extremely low ambient temperatures are present.

Conoflow Corp.
For more information, circle No. 215 on the Reader Service Card

HOLLOW CORE BLOWER . . . has swinging head

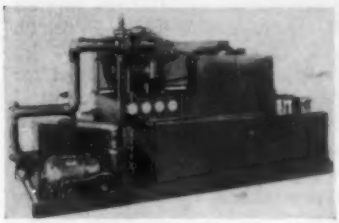
A new dual-station, fully automatic, hollow core blow and dump machine featuring a swinging head has been introduced.

A sand feed arrangement delivers sand from the main bin to a self-feeder hopper and transfers sand to the tube between blowing cycles. Thus with one side curing cores while the other side is blowing cores, output is claimed to be more than double conventional machine production.

Desired wall thickness is assured by electrically controlled heater units.

Harrison Machine Co.
For more information, circle No. 224 on the Reader Service Card

RECIRCULATING UNIT
. . . cools plating, baths



A refrigeration and recirculating unit has been developed to eliminate excessive process heat from plating and anodizing baths.

Known as "Chil-er" units, they cool by one of two procedures — by circulating cold water through lead pipes which are immersed in the acid bath, or by supplying cold water to special heat exchangers through which the acid is circulated.

The units can also automatically regulate process solutions to within 2 degrees for plating operations where close temperature control must be maintained. They are available in 22 models up to 150 ton refrigeration capacity.

Meyer Refrigerating Engineers, Inc.
For more information, circle No. 209 on the Reader Service Card

SELINIZING FLUID
. . . prevents corrosion

A possible new method for protecting aluminum alloy castings is revealed in a report from the Grand Rapids Testing and Research Laboratories. A panel of aluminum alloy base material has withstood more than 2,000 hours of continuous salt spray (ASTM —B117— . . . QQ-M-151a) with no evidence of base metal attack or related signs of failure.

The panel was treated with a single coating of Selinizing fluid, a silicone resin dispersion in a compatible organic solvent. The fluid was sprayed on, air dried and baked for one hour at 480 F before being placed in the salt box.

The resulting coating is 0.2 mils thick and has shown no loss of adhesion after the 2,000 hours of testing.

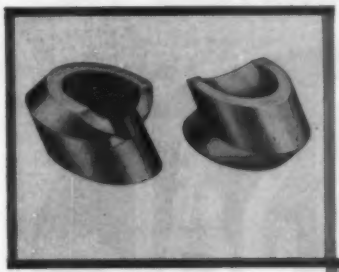
Selinized Process Co.
For more information, circle No. 220 on the Reader Service Card

Continued on next page

Basic Considerations in Selecting alloys . . . . for your

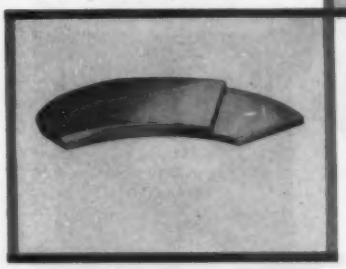
INVESTMENT CASTINGS

DO YOU KNOW THAT . . . an investment casting produced from a low cost metal may be MORE EXPENSIVE than one cast from higher priced material that may also have characteristics better suited to your requirements.



These angle connectors were originally investment cast in mild steel, a low cost material. To overcome corrosion problems, 303 stainless was substituted and because of its better castibility there was no increase in cost. Now, silicon brass is being used at a 10% saving on the original selling price.

This gage mount is an excellent example of unusually good casting characteristics of one metal offsetting a decidedly higher material cost. Originally priced in SAE 8620 steel, it was changed to beryllium copper at a 15% saving in unit price.



This simple textile machine part requires a high degree of wear resistance. Casting in the right metal provided better properties at lower cost than when machined from tool steel.

Get more complete information for this is only a small part of the story telling how the right metal selection for investment castings can often increase efficiency and reduce costs.

WRITE today for Bulletin 116-205 . . . it's FREE!

HITCHINER
Manufacturing Company
MILFORD 7, NEW HAMPSHIRE
REPRESENTATIVES IN PRINCIPAL CITIES

For more information circle No. 39 on the Reader Service Card

HYDROLUBE FLUIDS
. . . resist wear

Two fire-resistant hydrolube fluids, Ucon hydrolubes 150-CP and 275-CP are now available. Laboratory tests and industrial service over a two-year period have shown that wear resistance of the new hydrolubes is in the same general range as petroleum hydraulic oils, the manufacturers report.

Among the properties claimed for the fluids are excellent shear stability, high viscosity indices and low pour points. Fire hazards are minimized as long as the recommended water content is maintained.

Carbide & Carbon Chemicals Co., Div. of Union Carbide & Carbon Corp.
For more information, circle No. 214 on the Reader Service Card

NEW SET SCREW
. . . has self-locking action

A new self-locking set screw utilizes a unique locking action provided by an unthreaded portion of the crest. Called Crest-Lok, its manufacturers report that it eliminates the need for precise hole-tapping.

Locking action is provided by an unthreaded portion, a thread and a half high, at the crest of the screw. This is approximately the pitch diameter size, and tends to compress the crest of the threads in the tapped hole when driven to a flush position.

Other advantages claimed for the screw are that the amount of by changing the tap drill diameter, locking action can be controlled and that repeated re-use does not appreciably affect the locking action.

Set Screw & Mfg. Co.
For more information, circle No. 210 on the Reader Service Card

IN THE WEST IT'S . . .

UNIVERSAL
Die Castings

Preferred when only the best is good enough

When you buy your die castings from Universal, you are gaining the services of experienced die casting engineers, die designers, production men and management. You are putting a well-equipped shop to work on your castings. You will find, as hundreds of other companies have, that you can depend upon Universal for quality, service, delivery and prices that will help keep your own production costs down.

We Specialize In Brass Die Castings.

UNIVERSAL
DIE CASTING COMPANY

5001-05 Santa Fe Ave. • Los Angeles 58, Cal. • Phone Kimball 7264

For more information circle No. 75 on the Reader Service Card

PATTERN MATERIAL
. . . is all-synthetic

A new all-synthetic plastic pattern material has been made available for use in the investment casting industry. Known as Polycast #2, it is claimed to be self-lubricating for long cycles and said to give clean-lined glossy surfaced patterns.

The manufacturers report that Polycast #2 has performed especially well for difficult dies and for patterns where thin sections meet thin sections at evtreme angles.

A polymeric material, it is guaranteed to be free of natural materials such as vegetable wax, beeswax, paraffin or rosin. It is reported to have a low coefficient of expansion and excellent dimensional stability.

Wasco Laboratories
For more information, circle No. 212 on the Reader Service Card

ROTARY INDEXING TABLE
. . . holds up to 500 pounds

A 26-inch, air operated rotary indexing table has been designed to handle loads up to 500 pounds. Called the Pitt, it has an adjustable hydraulic control which assures cushioned stops under all load conditions.

A new splash oiling system permits all hardened moving parts to be fitted to much closer tolerances, providing indexing of ±.005.

Setup work is simplified by a double solenoid valve equipped with push buttons for rapid change over from automatic to manual operation. Operating pressures range from 75 to 100 pounds.

Pitt Industries
For more information, circle No. 213 on the Reader Service Card

STAINLESS SKIMMERS . . . for die casting

A new line of skimmers for use in die casting is now available in either mild steel or heavy gauge stainless steel.

Designed to meet die casters' skimming requirements, they are designed with a shallow radius which "skims" instead of "ladles" as deep cup-shaped skimmers do. Perforations are sized to prevent clogging.

The skimmers have three-inch handle stubs which fit common pipe, enabling the die caster to attach a handle of exactly the type and length desired. They are available in 6, 8, 10, and 12 inch diameters.

Spincraft, Inc.
For more information, circle No. 221 on the Reader Service Card

DRILL PRESS CONVERTER . . . has many uses

A new RC reciprocating converter is reported to make any drill press using a chuck taper spindle an all purpose machine. It can be used for any operation requiring accuracy in vertical sawing, filing, or slotting.

Made of high quality Durametal with two pre-loaded ball bearings, the converter comes in one and 1-¾-inch stroke models. The latter is furnished with a bronze sleeve insert.

Hunter Tools
For more information, circle No. 222 on the Reader Service Card

HEAT TREATING PROCESS . . . for stainless steel

A new process permits makers of small precision stainless steel parts to heat treat these parts to any degree of hardness or toughness without finish discoloration or dimensional distortion. The process is effective for all hardenable grades of stainless steel.

The process is achieved by precise control of the heat treating furnace atmosphere through special preparation of the atmosphere gases. A unique feature is that the process not only prevents distortion of the minute parts, but it can be arranged to produce controlled amounts of growth or shrinkage in dimensions of the parts.

Parts that are heat treated by this process are said to be sufficiently free of distortion and clean and bright enough that they can undergo finish machining before heat treating, while the material is still in the soft state.

Allied Products Div., Hamilton Watch Co.
For more information, circle No. 223 on the Reader Service Card

REMOVABLE FUNNELS . . . speed barrel loading

A line of removable funnels to fit all tumbling barrels has been designed to speed up loading of barrels and to minimize spilling of materials.

Made of heavy gauge steel, these funnels are quickly attached to the openings of the tumbling barrel and are just as quickly detached when the barrel is loaded.

Funnels are made for barrels from one gallon to eight cubic feet capacity.

Rampe Mfg. Co.
For more information, circle No. 207 on the Reader Service Card

Continued on next page

DIE CASTERS! DIE MAKERS!

SAVE on Die Construction Time!

With D-M-E STANDARD

DIE CAST DIE ASSEMBLIES!

Using D-M-E

STANDARD CAVITY RETAINER SETS

and

EJECTOR BOXES

D-M-E Cavity Retainer Sets are of high quality Alloy Steel and are precision ground, flat and square. Std. plate sizes are from ⅞" to 5⅞" thick and are aligned with sturdy, precision-built leader pins and bushings.

D-M-E Standard Ejector Boxes are of light-weight, welded steel construction. Now available in 15 standard sizes from 9" x 12" to 18" x 35½", with choice of 1¾" or 2" diameter Pinion Hole in the 12" and larger widths.

The Perfect Combination For Quality Die Casting

You'll SAVE TIME and MONEY with D-M-E STANDARDS!

Write today for complete specifications and prices on D-M-E Standard Ejector Boxes.

DETROIT MOLD ENGINEERING CO.

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Contact Your Nearest Branch FOR FASTER DELIVERIES!

DME

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CLEVELAND 9, O.-D-M-E CORP. 502 BROOKPARK RD., SHADYSIDE 1-9202
LOS ANGELES 7, CAL. 3700 SOUTH MAIN STREET, ADAMS 3-8214

For more information circle No. 31 on the Reader Service Card

PERFECT BALANCE and resistance to stresses while rotating at high speeds are requirements that must be met by the plaster mold castings in these torque converters for heavy earth moving equipment.

Torque Converter Castings . . .

need little machining or balancing

"MOUNTAINS moved, moderate rates!" Such a claim by an earth-hauling contractor is plausible today, thanks to a lightweight engine auxiliary made primarily of aluminum.

The auxiliary is a torque converter . . . a device which brings the advantages of fluid-drive power transmission to engines and motors of many sizes. Nowhere is the new-found efficiency of the torque converter demonstrated more dramatically than on massive earth-moving rigs. By multiplying torque when it is needed most, the converters aid the machines in rapidly reducing mountains to molehills.

The National Supply Company, famed as the world's largest manufacturer of oil field machinery and equipment, produces six basic types of torque converters with 17 power capacities, at their Toledo, Ohio, plant. Each consists of three or more sets of precision-molded aluminum alloy elements, affording a smooth transfer of power from engine to equipment. These elements—pump, turbine, and stator—are all close-tolerance products of Aluminum Company of America's Cleveland works.

By making possible a "stepless" transmission, the torque converter eliminates the necessity of continual clutching and declutching on engines which power machinery, just as it does in the modern passenger car. At the same time, it compounds the engine's power output and automatically adjusts it to changing loads.

When the job is easy, the torque converter turns effortlessly. When the task gets tough, it whirls into the work, like an extra hand at harvest time. The resulting smoother starts and faster acceleration afford more precise control of machinery, with no overloading or stalling. That adds up to reduced wear and tear on costly equipment.

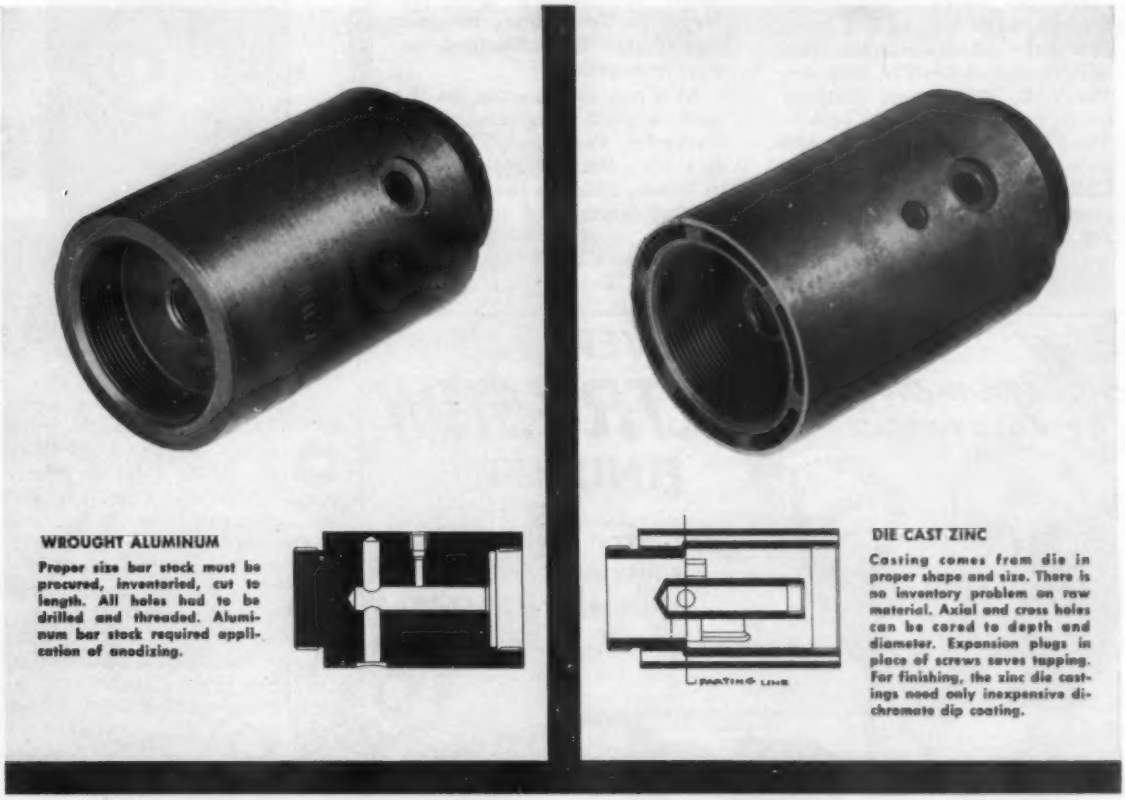
Behind the performance of these torque converters is more than five years of research and development work.

Plaster mold castings finally evolved in a design with such perfection of detail as to require machining only at easily accessible points. The elements then successfully passed stress analysis tests, when spun at high speeds in a "spin pit." Quality control requires that each of the cast elements pass rigid tolerance tests before leaving the foundry.

The elements now are being installed by National Supply in single-stage torque converters built in a range from 100 to 1,000 horsepower.

ROCKET FUSE IS REDESIGNED FROM WROUGHT ALUMINUM TO DIE CAST ZINC. RESULT:

50% cost reduction
No increase in weight



WROUGHT ALUMINUM

Proper size bar stock must be procured, inventoried, cut to length. All holes had to be drilled and threaded. Aluminum bar stock required application of anodizing.

DIE CAST ZINC

Casting comes from die in proper shape and size. There is no inventory problem on raw material. Axial and cross holes can be cored to depth and diameter. Expansion plugs in place of screws saves tapping. For finishing, the zinc die castings need only inexpensive dichromate dip coating.

Illustrations courtesy of MATERIALS & METHODS

THE SPECIFIC GRAVITY of zinc being 2.4 times that of aluminum, this re-design of an airborne component presents an interesting turnabout. The switch from aluminum bar stock to die cast zinc in the manufacture of the rocket fuse owes its success to the nature of the die casting process. It permits placing the metal where it is needed, eliminating it where it is not. Thus, coring of the zinc die casting has reduced the volume of the fuse body, and the weight was held to 6155 grains—the same as that of the aluminum product it replaces. By producing the fuse as a cored zinc die casting rather than turning it on a screw machine from aluminum bar stock, the following operations were eliminated: 1) cut off, 2) drilling three holes, 3) threading two holes, and 4) anodizing. The zinc die casting requires the following operations subsequent to ejection from the die: 1) trimming flash, 2) cutting two threads, and 3) dichromate dip.

The change, made by Monarch Governor Co. of Willow Run, resulted in a 50% cost reduction. Production rate has been increased from 100 aluminum to 150 zinc die cast fuses in the same amount of time.

DIE CASTING is the Process ZINC the Metal *BUNKER HILL the Preferred Zinc*

BUNKER HILL ZINC

99.99+%

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NEWS OF INDUSTRY & ASSOCIATIONS

activities of people, companies & groups in the precision metal molding industries

NEW OFFICERS ELECTED FOR SDE.

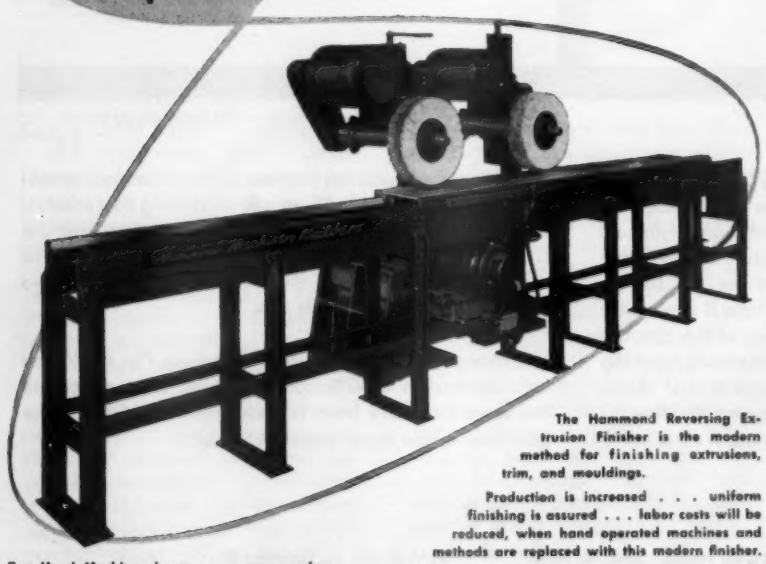
National headquarters of the Society of Die Casting Engineers, Inc. have announced the new officers elected for 1957, they are: Harry E. Eriksen — Chrysler Corp., president; Harry Cagin — The Halex Die Casting Co., vice president; Dean L. Rockwell — Clifford-Rockwell Co., trustee (1 year); William Van Raaphorst — American Mold Engineering, trustee (2 years); and Harris R. Shimel — General Motors Corp., trustee (3 years). Two other officers are appointed by the board of directors, they are: Meyer R. Tenenbaum, treasurer and George F. Griffenham, executive secretary.

As a national function for this year, a plant tour through the Chevrolet Passenger Transmission Div., General Motors Corp. in Toledo, Ohio has been planned. Further information on this tour can be secured from national headquarters, 19370 James Couzens Hwy., Detroit 35, Mich.

Hammond OF KALAMAZOO

REVERSING EXTRUSION FINISHER

for LOW COST, VOLUME PRODUCTION FINISHING OF EXTRUSIONS, TRIM AND MOULDINGS



The Hammond Reversing Extrusion Finisher is the modern method for finishing extrusions, trim, and mouldings.

Production is increased . . . uniform finishing is assured . . . labor costs will be reduced, when hand operated machines and methods are replaced with this modern finisher.

Two-Head Machine shown . . . any number of heads, and length of conveyor, can be supplied to suit your job.

SEND SAMPLES and we will show you how much you can speed up production and cut costs.

Hammond Machinery Builders

1642 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

SEE US AT BOOTH 165, WESTERN METAL SHOW

Los Angeles, March 25-29

For more information circle No. 85 on the Reader Service Card

PANGBORN CORP. ELECTS STINE

Victor F. Stine

Victor F. Stine has been elected, as of January 1, 1957, president of the Pangborn Corp. Concurrent with Mr. Stine's appointment, Ralph M. Trent assumes the duties of a director and executive vice president and W. O. Vedder was elected a vice-president. Thomas W. Pangborn, founder and president of the corporation since 1904 will continue to serve Pangborn as chairman of the board of directors.

Mr. Stine started with Pangborn 45 years ago as a bookkeeper, he became second vice-president in 1935. In 1941 he became vice-president in charge of sales and engineering and since 1951 has been a director.

PRICE OF ETHYL SILICATE REDUCED

A price reduction of five cents a pound for Ethyl Silicate 40 and Ethyl Silicate, condensed, has been announced by Carbide and Carbon Chemicals Co. The reduction in price is effective immediately. This brings the price of Ethyl Silicate 40 down to 42 cents a pound, in tank car lots, and Ethyl Silicate, condensed, to 30½ cents per pound, also in tank car lots.

According to company spokesmen, the price reduction has been made possible as the result of process improvements that have resulted in substantial economies — these are being passed on to the customers. Both forms of Ethyl Silicate are used in the investment casting industry as mold binders.

Designed for Longer Life!

acf REFAX® POTS

Tapering wall thickness of acf Refax Pots minimizes swelling and distortion melt after melt after melt... assures far longer life. For complete information on the full line of acf Refax Pots, Utility Castings, Ingot Molds and Goosenecks, write Dept. 2-I for illustrated bulletin.

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acf Industries, Incorporated

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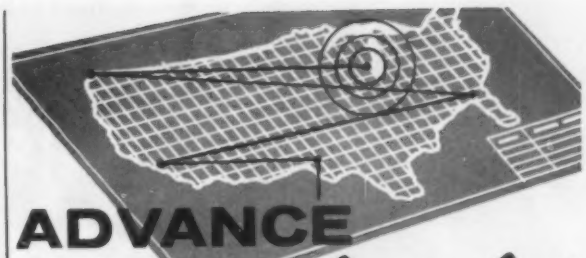
For more information circle No. 1 on the Reader Service Card



ADVANCE

known from Coast to Coast

creative engineering and production skill

Whether it's a new product or redesign of an existing product, die casting design problems find their solution in Advance engineering. With over 36 years of creative experience and production skill in aluminum and zinc, there is good reason why Advance services are sought by manufacturers from coast to coast.

We, at Advance, are proud of our nation-wide services in the production of aluminum and zinc die casting components and are determined to maintain our reputation.

Next time, send your drawings to Advance for a die casting survey and cost estimate.

FOR ZINC AND ALUMINUM DIE CASTINGS

Instrument Parts

Small Engine Cylinders

Motor Housings

Camera Parts

Control Valve Components

Valve Cases

These symbols are your assurance of highest quality control of zinc and aluminum alloys under ASTM standards

ADVANCE TOOL AND DIE CASTING CO.

3760 N. Holton St.
Milwaukee 12, Wis.
Dept. M-1

36 years of service to industry

For more information circle No. 3 on the Reader Service Card

For more information circle No. 38 on the Reader Service Card

this movable element unit was Intercast®
—cast-assembled in one operation

by GRC

GRC's unique, patented method **intercasts** multiple-part zinc-alloy units with moving elements in a **single, automatic, time-saving, money-saving** operation . . . even continuously interlocked assemblies (like chains). No assembling. The unit leaves the machine—trimmed, ready for plating or immediate use.

This INTERCAST technique is an ingenious refinement of GRC's exclusive method of small parts die casting—a method providing broad latitude in design, close tolerance in production, profitable time and cost economies in quantities of 100,000 to many millions.

Let GRC solve your problems . . . in design . . . in production. Send for fact-filled bulletin, samples and other information, TODAY.

World's Foremost Producer of Small Die Castings

GRIES

GRIES REPRODUCER CORP.
157 Beechwood Avenue, New Rochelle, New York. NEw Rochelle 3-8600

TITANIUM ALLOY MFG. EXPANDS

The Niagara Falls plant of National Lead Co.'s Titanium Alloy Mfg. Div. is to undergo a major expansion of its manufacturing facilities. The expansion is necessary to satisfy increased demand for zirconium oxide and zirconium dilicates, products used in the manufacture of wall tile, ceramic ware, porcelains and enamelled goods, glass polishing and refractories. The project is scheduled for completion by July 1, 1957.

A new building for the expanded production will house new equipment consisting of mills, pulverizers, mixers, dryers and tanks with necessary handling equipment. 4,000 additional kilowatts of 60 cycle power will be made available for the expanded facilities.

YOU Can Get-- 100,000 SHOTS Per Set with AUTO-DIESEL PLUNGER RINGS

Others are getting 100,000 shots per set from Auto-Diesel Hardened Steel Plunger Rings and so can YOU. (Names supplied upon request). They last for MONTHS instead of HOURS. This also reduces costly down-time which in turn reduces maintenance to the minimum. Made of cast iron, dieloy cast iron or hardened steel. Anyone operating die casting machines or casting zinc parts can save money. It will pay to write for details.

AUTO-DIESEL 2 or 3 Piece Plunger Segment Rings give LONG LIFE

You save money with Auto-Diesel 2 or 3 piece Plunger Segment Rings because they give LONG LIFE which reduces down-time and expensive repairs. Made of high grade wear resisting iron in sizes from 1½" to 4" by ⅞. Write today for prices.

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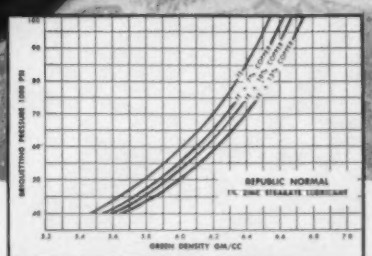
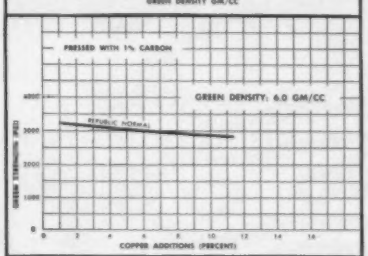
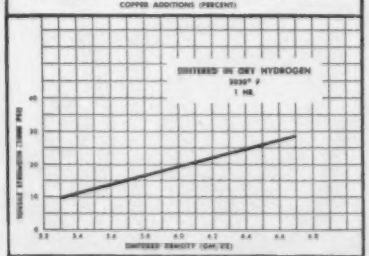
NEW Type "N" (Normal)

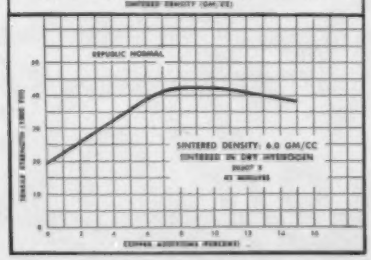
REPUBLIC IRON POWDER WITH

Controlled dimensional factor









Allows dimensional variation from slight shrinkage to slight growth

Type "N", for normal, is the designation given to a new grade of iron powder now being produced by Republic's Metal Powder Division.

This powder has been given normal variation in dimensional change from a slight shrinkage to a slight growth, depending upon the end result required by the fabricator. This change characteristic is called *Controlled Dimensional Factor*—an exclusive Republic development.

Type "N" powder offers a practical and economical solution to fabricators faced with the problem of what to do with dies that have become oversize through wear. This grade of powder makes possible the production of parts to original dimensions without extensive re-working of dies.

The excellent chemistry and high green strength always associated with Republic Iron Powder have been retained in Type "N". The accompanying curve charts represent the average of numerous tests conducted in the development of Type "N". For purposes of standardization, all values presented are the result of sintering in a dry hydrogen atmosphere. In all cases one percent zinc stearate was used as lubricant.

Complete information on the physical properties and chemical composition of Type "N" are contained in Republic Booklet Adv. 763. Write for it.

REPUBLIC STEEL

Metal Powder Division • Toledo 5, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

For more information circle No. 68 on the Reader Service Card

NEW ENGINEER NAMED FOR DOEHLER-JARVIS

George F. Hodgson

George F. Hodgson has been appointed assistant chief engineer of the Doehler-Jarvis Div., National Lead Co., according to an announcement from Frank J. Koegler, vice-president of National Lead. Hodgson will transfer to the general offices of Doehler-Jarvis in Toledo, Ohio as a result of the appointment.

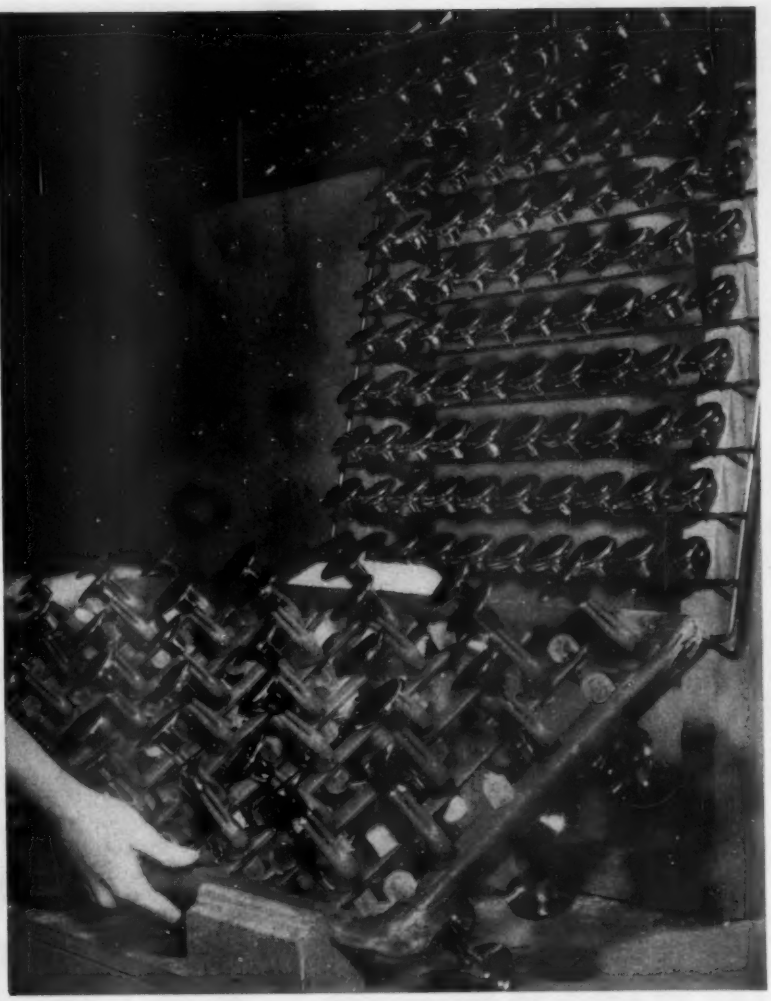
Mr. Hodgson joined Doehler-Jarvis in 1931 in the development department of the Batavia plant. In 1935 he was transferred to Toledo where he worked in the metallurgical laboratory. In 1936 he was transferred back to Batavia as plant metallurgist, and in 1952 was made chief plant engineer.

CELANESE EXECUTIVE RETIRES

Peter D. Cooper is retiring as vice president and director of Celanese Corp. of America, following 32 years' association with the company. Mr. Cooper came to this country in 1924 at the request of the founders of the company to serve as cost accountant. A native of Glasgow, he previously had been associated with Nobel Explosives Co. in Scotland and the British Celanese organization. He became vice president in 1945 and a director in 1949.

BUY URANIUM MINE

The New Jersey Zinc Co. and the Texas Co. have announced the joint purchase of the Happy Jack Mine in Utah from the Bronson & Cooper Mining Co., Monticello, Utah. Substantial tonnages of uranium ore have already been blocked out in the mine. The purchase was made through the Texas Zinc Minerals Corp., jointly owned by the two companies.



FEDERATED ALLOYS FOR THE DIE CASTING INDUSTRY

DI-METAL . . .
a zinc base alloy of high purity, produced in three grades to meet all required mechanical properties.

ALUMINUM ALLOYS . . .
produced by Federated to conform to the ASTM, SAE, AMS, USN, Federal and AMS specifications.

Federated has 12 plants and 22 conveniently located sales offices which can give you expert assistance in choosing and applying a die-casting alloy; and which assure you of prompt delivery when you require it.

FEDERATED products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust

Four facts prove Federated's quality claims for Di-Metal Alloys

1. Only special, high-grade zinc, 99.99 percent pure, is used to make Federated Di-Metal.
2. The zinc is refined by American Smelting and Refining Company, which developed and perfected the strontium method of electrolytic production for the most accurate control of lead content.
3. Alloying ingredients are added in exact proportions under the direction of Federated metallurgists.
4. Spectrographic or quantometric testing, supported by chemical analysis, controls the quality of every melt. Not a pound of untested metal is shipped by Federated.

Federated field specialists work from 22 offices and 12 plants throughout the United States. One is always near by if you need emergency help.

Call your nearest Federated office. Ask for more information about our Di-Metals. It will pay you well to try them.

Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

For more information circle No. 36 on the Reader Service Card

NAMED CHIEF METALLURGIST

Theodore W. Bossert has been appointed chief metallurgist of Aluminum Company of America, it has been announced by C. F. Nagel, Jr., vice president.

Mr. Bossert has been serving as assistant chief metallurgist of the metal manufacturing divisions since 1951. As Alcoa's new chief metallurgist, he will head the metallurgical division of the operating department.

Mr. Bossert received his B.S. degree in chemical engineering from Massachusetts Institute of Technology in 1921. His Alcoa career started in January, 1923, when he joined the technical direction bureau at New Kensington, Pa.

DENISON ENGINEERING IS DIVISION OF BRAKE SHOE

American Brake Shoe Company has announced that The Denison Engineering Company, with main offices in Columbus, Ohio a wholly owned subsidiary since June 1955, became a division of the company, effective September 1.

For many years a leading manufacturer of hydraulic presses, hydraulic pumps, motors, and automatic controls for aircraft and industrial uses, Denison operates two plants, one in Columbus and one in Delaware, Ohio. A large addition to the Columbus Plant is now being completed.

NEW PLANT TO PRODUCE TANTALUM AND COLUMBIUM

Plans have been drawn and a 113-acre site purchased for the production of tantalum and columbium by Fansteel Metallurgical Corp. Designed to increase present tantalum output by 50 percent and columbium output by 150 percent, the new $6,500,000 plant will be located near Muskogee, Okla.

The plant will comprise four buildings with an aggregate of 95,000 sq. ft. of floor space. Operations will include powder metallurgy, sintering, ore treatment, chemical and electrochemical processes, and vacuum arc casting.

About 200 persons from the Muskogee area will be employed initially, but the number is expected to reach 500 within four or five years. Buildings are being designed in such a way that facilities can be doubled.

COST REDUCTION

continued from page 37

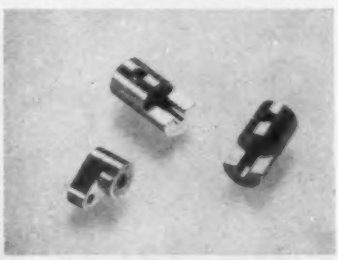
While actual savings are not great, the nickel silver parts are easier to handle. They also eliminate a difficult machining operation. The superior surface finish of the powdered metal parts give more uniform braking and a slightly lower sound level than could be obtained with a machined governor weight.

New Designs In Process

Many other components are in various stages of redesign, tooling and pilot production runs as a result of the cost reduction program. Shown here are three powdered brass parts for which tooling has just been completed and early production is now being received. These are cams for use in a multi-line telephone, providing the interlock between the hook switch and the hold keys. These pieces will be supplied complete by the vendor, including the tapped holes.

A stop washer measuring .755 diameter with a D-shaped hole in the center and a stop-lug on the perimeter is now being considered for production from powdered iron. It is currently made of .050 thick quarter hard brass sheet. Certain design problems have yet to be worked out before these plans can be advanced.

A bridge, which is a U-shaped structural component customarily made by stamping and forming brass sheet, is now being replaced by a zinc casting. Prototype zinc alloy bridges are presently undergoing exhaustive testing in the Stromberg—Carlson laboratories. The advantages in cost and design are strongly in the favor of the die casting, and there is little doubt that this material will meet all physical requirements.



NEWEST REDESIGN includes these three powdered brass parts, cams for a multi-line telephone. These are early production samples.

Prototypes for testing new materials can be something of a problem in industry, especially for those processes where tooling costs are high and the engineering department wants to run tests before investing in tools. Stromberg Carlson solves this, where powdered metal parts are concerned, by machining the finished shape from powdered metal blanks supplied by the vendor. This procedure was followed with each of the powdered brass components described above.

CRUCIBLE STEEL BUYS VACUUM METALS DIVISION

During 1956 Crucible Steel Co. of America acquired complete ownership of Vacuum Metals Corporation, the country's first commercial producer of high vacuum cast metals and alloys. The plant and vacuum melting facilities are located at Syracuse, N. Y., and now operate as a division of Crucible.

die casters...
designers...
engineers...

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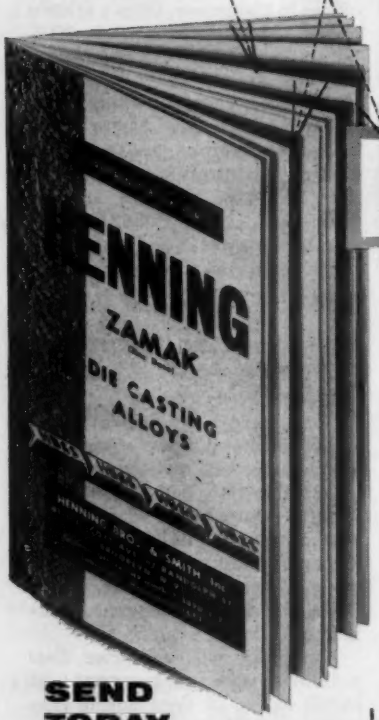

Get Henning's informative Reference Book on Zamak (zink base) die casting alloys and find out how you can get more efficient results when you specify the Zamak alloy that meets your precise needs — and at lower cost.

Die casters will find specific details on those requirements of alloys which affect the properties, both mechanical and physical, of the casting produced.

Designers and engineers will find information on those special requirements of alloys which effect the casting operation. Thus they can evaluate the ease of casting with the cost and possible design limitations which must be considered.

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for your copy of this handy, pocket-size booklet. Ask for #27-Z; no cost or obligation, of course.

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"Dependable service since 1922"

Smelters & Refiners of • Aluminum • Bronze • Brass • Zinc • Lead

All ingot produced under laboratory control

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MOUNTINGS

continued from page 39

To secure the necessary fastening without damaging the housing casting, the mounting brackets have been designed with a cast pressure finger onto which the set screw presses. By virtue of a relatively large area of contact, adequate holding power is secured with only light pressure on the finger. The particular construction employed is illustrated in Figure 3. While die cast zinc is not notable for its elastic properties, it is sufficiently elastic for this purpose.

The several design features discussed, plus the liberal use of metal savers as shown in Figure 3, are all possible because of die casting. While some of the advantages could be secured by expensive machining operations, there are others that, in all probability, could not be accomplished at all by conventional methods of machine shop operations.

Finally, a word about surface finishing. Because of the excellence of the surface as cast, all of these parts are simply degreased, given a Galvaprep surface treatment prior to painting and then spray painted with a hammertone finish paint. Infra-red baking completes the finishing operation.

BART-MESSING MERGES WITH SEL-REX CORP.

The merger of Bart-Messing and Sel-Rex Corporations, both of Newark, New Jersey, effective January 1st, 1957, has been announced by the board of directors of both companies.

The older of the two companies, Bart-Messing has been a leading manufacturer and distributor of Power Rectifiers, Filters and Metal Finishing Equipment and Supplies for nearly fifteen years. The Sel-Rex Corporation has been prominent in the precious metals processes manufacturing field since its inception as Sel-Rex Precious Metals, Inc., five years ago. As the latter company grew, its product line expanded to include a wide range of non-precious metals items and electroplating processes. To avoid the possible misapprehension that the company was active in this field exclusively, "precious metals" was dropped from the corporate name, last year.

PLAST-IRON

Pampered Powders

provide new profits for fabricators!

A new and better iron powder—Grade B-261—is finding new friends for *Plastic Metals*. Fabricators are discovering that compacts produced from B-261 offer improved tensile, hardness and elongation properties which have not been obtainable even with more costly copper-iron mixes.

PLAST-IRON Grade B-261 is just one of a large family of *pampered powders* produced by *Plastic Metals*, America's oldest commercial producer of iron powders. They're *pampered* by premixing, blending and balancing under rigid manufacturing controls in the most modern processing and packaging equipment available.

We will be glad to pamper a premix to your specifications, especially if you use 24,000 pounds or more of a single mix.

Iron; manganese; nickel; silicon; steel and alloy powder and electrolytic iron—
for
—fabrication of fine machine parts; enrichment of flour; cutting and scarfing of alloy steels; manufacture of welding rods.

Tell us about your fabricating problems. We may have a premix precisely compounded to solve them. Write:

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PM PLASTIC METALS

PLASTIC METALS
Division of
National-U.S. Radiator Corporation

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ADVANCED!

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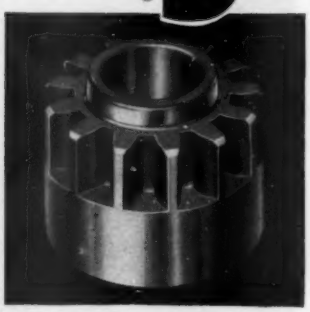

The newest facilities for the production of bearings and parts made of Sintered Powdered Metal and Cast Bronze Alloys are offered to designer, engineer and machinery manufacturer by The Bunting Brass and Bronze Company.

Bunting resources, reputation and responsibility together with a complete new plant and modern equipment provide Sintered Powdered Metal products at a high point of quality and precision.

Bunting Engineering is available without cost or obligation to all. Write for new Bunting Engineering Hand Book. 24 pages packed with new technical data on powdered metal products manufacture and application.

Sintered Plain and Flange Bearings, Solid and Tubular Bars and Thrust Bearings, Cast Bronze Plain Bearings and Bars are available from stock in a wide range of sizes. Quotations for special bearings or special parts will be sent promptly on receipt of prints.

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BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL

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OPPORTUNITIES

jobs & equipment

Opportunities rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding, 812 Huron Rd., Cleveland 15, Ohio. Closing date: 1st day of month preceding publication.

POSITIONS OPEN

WANTED—Experienced investment casting salesmen. Write Box No. 2357.

ALUMINUM DIE CASTING MANAGER —To assume full responsibility for the management, growth and development of the Die Casting Division of a large Eastern Foundry. An excellent opportunity for a man thoroughly familiar with all phases of the die casting business to become an integral part of this business and share in its profits. Write Box No. 2557.

ALUMINUM PERMANENT MOLD MANAGER — For large, established Eastern Foundry. Will consider only highest caliber men who are thoroughly familiar with technical aspects of permanent mold casting and have the leadership and management ability to assume responsibility of plant operation at top management level. This is a real opportunity for a man with the right qualifications to become part of and share in the profits of a growing organization. Send complete resume. Confidential. Write Box No. 2657.

MANUFACTURERS AGENTS WANTED —To handle well-established repeat supply item sold to pressure die casters. Leader in its field. Splendid earnings opportunity with a product that is a "household name" in the die casting industry. Give full details concerning lines handled. We are especially interested in frequency of contact you now have with pressure die casters. Write Box No. 2857.

REPRESENTATIVES WANTED — We are changing our sales policy and are interested in discussing the sales of our melting furnace equipment with representatives in various districts outside of New York and Chicago. We manufacture a complete line of gas and oil nonferrous melting furnaces in all sizes and types. Also interested in a salesman for our home office. Write Stroman Furnace & Engineering Company, 9900 Franklin Avenue, Franklin Park, Illinois.

DIE DESIGNER — Wanted experienced die casting die designer for aluminum. Relocate Central Atlantic seaboard. Salary and bonus. Replies kept confidential—excellent opportunity. Write Box No. 2757.

EQUIPMENT

WANTED — Cleveland Die Casting Machine — 200 ton, zinc or aluminum. State age and price in first letter. Write Box No. 2157.

FOR IMMEDIATE SALE — Reed-Prentice #1½ zinc die casting machine with interchangeable cold chamber end for aluminum or magnesium. 250 ton die locking pressure. 1947 Model. Write Box No. 2257.

HIGH FREQUENCY CONVERTERS FOR SALE—Two completely rebuilt 12KW Ecco Induction Melters. Submit offers to Box No. 2457.

C. F. BERAN RETIRES

Charles F. Beran is retiring as a director of Celanese Corporation of America, following 33 years' association with the Company. He will be succeeded by Richard W. KixMiller, vice president in charge of the Celanese Chemical Division.

For more information circle No. 71 on the Reader Service Card

You Can't Buy Better ALUMINUM ALLOY DIE CASTINGS AT *ANY* PRICE!

The same unexcelled Quality and Service which has made the name of **STROH** foremost in Zinc die casting for fifty years, will govern our new Aluminum facilities. When you deal with **STROH** you deal with a company of over half a century of concentrated experience. *The name guarantees the result.*

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NOW AMERICA'S LARGEST FOUNDRY EQUIPMENT DEALER BRINGS YOU

100% GUARANTEED • REBUILT
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OVER 2,000 PIECES IN STOCK

SAVINGS BETWEEN 50% to 58% OFF THE PRICE OF NEW EQUIP.

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FOR COMPLETE PRECISION INVESTMENT CASTING SERVICE
acrocast

The accuracy with which DEAN Precision castings are made reduces the need for machining to a minimum. When machining is required DEAN facilities give assurance of one vendor economy. These facilities include: milling, drilling, tapping, reaming, grinding, hobbing, etc. SAVE time and money, one vendor economy and responsibility assures satisfactory results.

Check on DEAN services TODAY. Send us your prints or sketches for prompt engineering assistance and quotations.

A few exclusive industrial areas are available to established manufacturers representatives.

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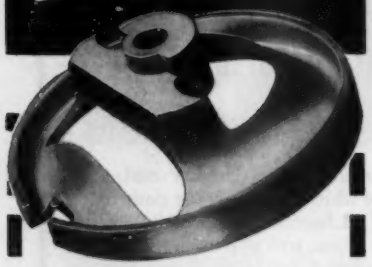
Cam Milling and Contour Machining *Eliminated!*



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PART: Cam for Aircraft Instrument

MATERIAL: Stainless Steel, 440

PROBLEM: To reduce time and cost involved in setting up and performing 8 different types of machining operations.

SOLUTION: An EPCO Investment Casting Completely dispensed with

1. Cut-off
2. Turning O.D.
3. Center Hole Drilling
4. Form Turning
5. Form Milling
6. Contour Milling
7. Slot Milling
8. Cam Milling

Leaving only cam polishing, bottom grinding and hole reaming.

CONCLUSION: Intricate Machine Parts by redesigning to EPCO Investment Casting tolerances can be made to give better performance at far less cost.

Send us drawings, samples and specification of parts for detailed process analysis and cost quotation without cost or obligation.

ENGINEERED PRECISION CASTING CO.
FREEHOLD RD.
MATAWAN, N. J.

MEMBER INVESTMENT CASTING INSTITUTE

Circle No. 34 on the Reader Service Card

CONFORMING MATRIX CORP. EXPANDS FACILITIES

Conforming Matrix Corporation, Toledo, manufacturers of spray decorating masks, mask washers and standard and special spray painting machines, has leased an additional 5000 sq. ft. to be added to the machine building division, according to an announcement by H. E. MacArthur.

The nickel tank capacity also is being doubled in the masking department. A research and development department has been set up with men assigned full time to the project, and a complete operating spray decorating display showroom will be set up for viewing new developments and testing the painting of customer parts on various types of machines.

MacArthur also announces the elevation of Leo McHue from service and sales engineer to the post of sales and production coordinator, and the appointment of Kentucky as sales representative. Charles VanDusen is being added to the sales staff which includes H. E. MacArthur, Leo McHue, Gerry Minnick, and A. M. McIntire.

DATA IN ADS

continued from page 20

89. Machine Deburring—of inaccessible holes can be done with Nobur tools. A complete catalog of these special tools is available from Nobur Mfg. Co.

91. Precision Barrel Finishing—is the title of a new booklet issued by Oakite Products, Inc. It contains valuable information on cutting down, deburring, descaling, and burnishing.

92. Magnesium Dust Control—The "wet method" of magnesium dust collection and control is the best, according to a new brochure from Peters-Dalton, Inc.

93. Complete Finishing—Basic process, chips, compounds, and a complete equipment line is described in a technical data folder from Roto-Finish Co.

94. Automatic Injector—The first completely automatic industrial injector for wax or plastics is described in Bulletin No. 1202 from Centrifugal Casting Supply Co.

ALL NEW! THE FIRST COMPLETELY AUTOMATIC INDUSTRIAL INJECTOR FOR WAX OR PLASTICS

Ask for Bulletin No. 1202

ASSURES INCREASED PRODUCTION

Injecting at pressures up to 1500 PSI the new "3C" INDUSTRIAL INJECTOR cuts production cost of wax patterns through more accurate and speedier operation.

Complete Cycle—clamping, injecting & release of mold requires just the flip of a switch.

Injects up to 2½ lbs. of material in one cycle.

Thermostatic controls insure correct, uniform temperatures at all times.

Large capacity tank holds up to 75 pounds of wax or plastic.

NEW ADDED FEATURE

A complete oil and water circulating system controls the temperature of the wax within 2° throughout the entire process.

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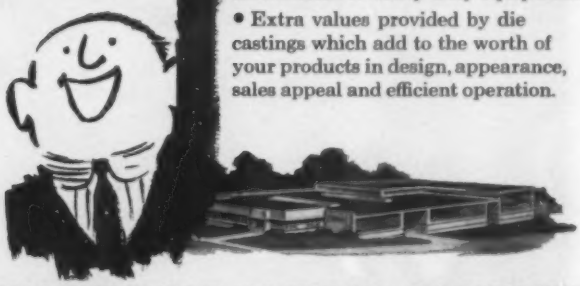

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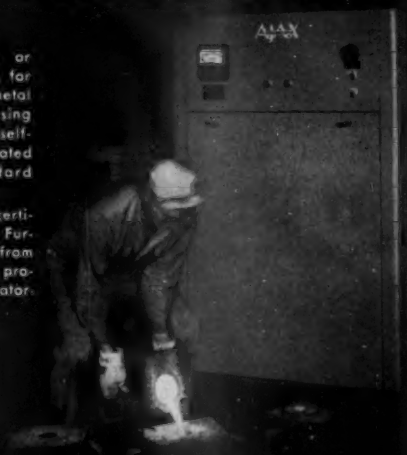

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